

THE STATE OF THE WORLD'S CHILDREN 1984



United Nations Children's Fund
(UNICEF)



THE STATE OF THE WORLD'S CHILDREN 1984

COMMUNITY HEALTH CELL

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James P. Grant
Executive Director of the
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I

THE STATE OF THE WORLD'S CHILDREN 1984

James P. Grant

A Revolution for Children

The Challenge

Recession
'Waiting for development'
The new road
The sinister alliance

The Cutting Edge

Growth monitoring
Breastfeeding
Oral rehydration therapy
Expanded immunization
Synergisms

The Mother of Change

Food supplements
Family spacing
Female education
Slowing population growth

Inner Development

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Definitions

The infant mortality rate (IMR) is the number of infants who die before reaching the age of one year per thousand live births in a given year.

The child death rate (CDR) is the number of deaths of children aged 1–4 per 1000 children in the same age group in a given year.

A Revolution for Children

In the last twelve months, world-wide support has been gathering behind the idea of a revolution which could save the lives of up to seven million children each year, protect the health and growth of many millions more, and help to slow down world population growth.

Last year's *State of the World's Children* report outlined the recent advances in both biological science and social organisation which now make this revolution possible. Since then, the combined potential of these breakthroughs has been acknowledged by world political and religious leaders including the Presidents or Prime Ministers of Bolivia, Britain, Canada, Colombia, France, Haiti, India, Pakistan, the Philippines, Sri Lanka, Sweden, Tanzania, Thailand, and the United States.

Also in the last year, more evidence has been coming in from around the world to show that these drastic gains in child well-being can indeed be achieved at a relatively low cost and in a relatively short time – despite economic recession. The case studies in this year's report document actual examples of the techniques which make this revolution possible.

In brief summary, those techniques are:-

- Oral rehydration therapy (ORT) – a simple and inexpensive method of preventing or correcting the dehydration which is induced by diarrhoeal infections and which, with an estimated 5 million young victims a year, is the leading cause of child death in the modern world (see pages 31–41).
- Growth monitoring – the use of simple 10-cent child growth charts which, along with regular monthly weighing and back-up advice, can help parents to make better use of the food they have and prevent up to half of all the malnutrition in the developing world (see pages 25–27).
- Expanded immunization – using newly-improved vaccines to prevent the six main 'immunizable' diseases from killing an estimated five million children a year and disabling five million more (see pages 41–45).
- The promotion of scientific knowledge about

the advantages of breastfeeding and about how and when an infant should be given supplementary foods (see pages 27–31).

In several developing countries, commitments have already been made to put these ideas* into action. In response to last year's *State of the World's Children* report the city authorities of Addis Ababa have publicly stated their intention of using these techniques to halve child deaths in the next four years. In Pakistan, the government has launched an Accelerated Health Programme which has already tripled the immunization rate and increased the distribution of oral rehydration salts from 1 million to 5 million packets a year. In Haiti, the response has been the launching of an intensive nation-wide programme with the proclaimed intention of reducing infant and child deaths by at least 25% in the next three years. In Colombia, President Betancur has responded to the report by saying that: '*This document informs on four recent scientific advances and offers the hope that, with a great effort by governments and communities, the outlook (for children) by the end of this century will be much better. All of these techniques will be applied here in Colombia.*'

In New York, UN Secretary-General Javier Pérez de Cuéllar has said that: '*National efforts to mount such campaigns are now possible because the community networks and the means of communicating necessary for parents to learn about the forms and uses of simple therapies are increasingly available in many countries ... Innovative and cost-effective action along these lines would demonstrate that even in times of acute financial strain for social services and international co-operation, it is possible for the world to take imaginative steps to heal some of the most tragic wounds of under-development and poverty. I appeal to national leaders, to communicators, to health-care workers, and to concerned institutions and individuals to support this action.*'

*If the three 'F's of food supplements, family spacing, and female education (see pages 49–60) could be added to these four techniques, then the number of children whose lives would be saved – and the number whose growth would be protected – would be even more dramatic. But in comparison with the four simple and inexpensive measures outlined above, family spacing is more difficult, food supplementation is more costly, and extending female education is both.

Guatemala: halving deaths

In 1982, almost 400 'health promoters' in the eastern region of Guatemala began distributing oral rehydration salts as part of their routine work in the community. In total, the salts went out to a population of 64,000 people – a population in which the leading cause of child death was the dehydration induced by diarrhoea.

Ready-made sachets of salts were in short supply, but the problem was quickly and cheaply overcome. Using a simplified formula of sugar, salt and potassium chloride, packets of salts were made up at the local health centres. The initial cost of each local production plant was \$550. Thereafter, one worker could produce around 300 packets per day at a cost of 1.5 cents each.

From the local centres, the health promoters made their rounds of the community to educate parents on when and how to use the salts. At the same time, posters were pasted up throughout the community warning of the dangers of diarrhoea. Almost all children suffer from diarrhoea some of the time. Most recover quickly, but in about 10% of cases dehydration suddenly sets in and then the child's life is seriously at risk.

Home visits by the health promoters taught parents that it was dehydration which killed their children and that early rehydration – at home – was the best cure. Each family was also given six small (250 ml) sachets of the locally made salts along with a sheet of clear, printed instructions. Because the health promoters were part of the community, they were almost always on hand to give advice and help at the moment when a mother actually had to start giving oral rehydration therapy to her child. After the first few times,

most mothers became confident about using the salts and many became active promoters of the idea.

Before the campaign began, knowledge about oral rehydration therapy was almost zero. Packaged salts had been available at pharmacies. But there had been no promotion; so sales were low and costs were high. After the campaign, almost 90% of families with young children had packets of the salts available in their homes and over two thirds knew how and when to use them. The result was that actual use of the oral rehydration technique increased from less than 1% of diarrhoeal cases to more than 30%.

Most important of all, the number of child deaths from diarrhoea fell by half in the year after the introduction of the salts.

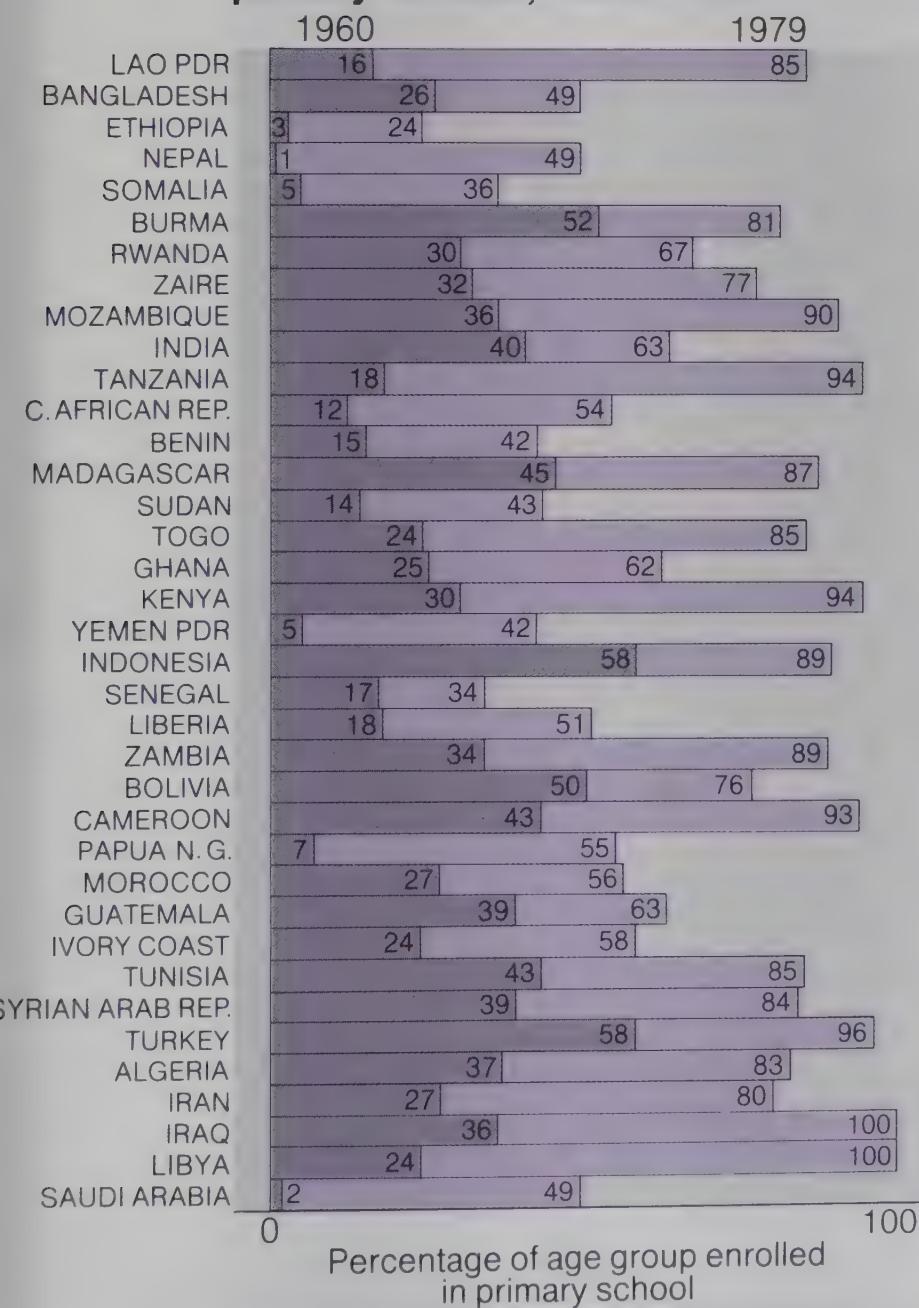
Even bearing in mind that yearly fluctuations in the child death rate are not uncommon in the area, the result is an impressive one. The total cost of expanding this campaign to the rest of the country (including the cost of the salts themselves) has been estimated at 4.7 cents per person or 0.2% of the country's health budget.

In the view of those involved in the campaign, the successful introduction of oral rehydration therapy would not have been possible without the spread of a primary health care network which had put a health promoter close to every family and involved people in action for their own health. To make a child health revolution possible, such 'social breakthroughs' are as essential as the technological breakthroughs themselves.

In the industrialised world also, the potential significance of these breakthroughs has not gone unheeded.

In Washington, the U.S. Senate has adopted a resolution saying that: '*the techniques articulated by UNICEF in its report entitled "The State of the World's Children 1982-83" represent an unprecedented low-cost opportunity to significantly reduce child mortality and morbidity throughout the world, and*

Fig. 1.1 Enrolment of girls in primary schools, 1960-1979



Source: World Bank, *World Development Report, 1982*

have the full support and encouragement of the Congress at a time of economic difficulty and constriction for all countries.'

In Rome, the Holy See has announced that '*the entire Catholic aid network in the various countries of the world, and especially in the developing nations, will lend its maximum support to these important simple proposals to improve the health of hundreds of millions of children'.*

The techniques which now make all of this possible have been pioneered in recent years by governments and health ministries; by doctors and paediatricians; by nurses and primary health care workers; by international agencies like UNDP, WHO, the World Bank, the International Red Cross and UNICEF itself; by voluntary agencies like the Save the Children Fund and Oxfam; by religious organisations of many faiths; by secular movements like the Bangladesh Rural Advancement Committee; and by institutions like the International Centre for Diarrhoeal Disease Research in Bangladesh or the Institute of Child Health in London.

Although constantly being refined, the breakthroughs in knowledge and technology already exist. But like all scientific or 'knowledge breakthroughs', an equivalent 'social breakthrough' is also necessary if they are to be taken off the shelf of potential and put at the disposal of peoples. And on this front also, the world has been changing.

Only twenty years ago, for example, the proportion of girls in the developing world who went to primary school and had the chance to become literate was less than 35%. Today it is over 80% (see Figure 1.1). Only twenty years ago, the radio was a rare novelty in the poorest half of the world. Today, there is at least one transistor for every two homes. Only twenty years ago, there were hardly any primary health care workers in the developing world. Today, there are over three million paramedics at work.

In short, these and other social advances of recent times are bringing the world to a position of great potential for progress. Slowly, the channels are being opened up between what science knows and what people need.

Papua New Guinea: prescribing bottles

After independence in September 1975, the new government of Papua New Guinea became increasingly concerned about rising malnutrition and diarrhoeal diseases among the young children of the capital city, Port Moresby.

At the same time, surveys were reporting a steep fall in breastfeeding. In 1964, 94% of the mothers who left Port Moresby General Hospital were breastfeeding their babies. By 1974, the figure had fallen to 78%. Over approximately the same period, hospital admissions and deaths from gastro-enteritis had doubled.

A 1975 survey in the city found that 35% of babies were being artificially fed and that over two thirds of them were malnourished. Among breastfed babies, on the other hand, only a quarter were seriously underweight.

By 1976, the government was taking action to halt the decline of breastfeeding in Port Moresby and to prevent the bottle-feeding habit from spreading to the rural areas. All advertisements for artificial infant feeds were banned, and educational campaigns on the advantages of breastfeeding were mounted for health workers, schools and community organisations.

Towards the end of that same year, it was clear that the battle was being lost. Sales of artificial baby milk were hardly affected and the attempt to persuade shopkeepers and supermarket chains to voluntarily restrict sales of feeding-bottles had had little or no effect.

In July 1977, the government passed the Baby Feed Supplies (Control) Act into law. From now on, feeding-bottles and teats could only be bought from pharmacists and only on prescription from a qualified health worker. Before signing such a prescription, health workers were required to make sure that there was a good reason for changing to artificial baby-milk and that the baby's mother knew both how to mix up the formula in the right strength and how to keep the bottle and teat sterilised.

The penalty for supplying feeding-bottles illegally was steep: \$300 for a first offence and \$750 for second and subsequent offences. Almost overnight, feeding-bottles disappeared from the shelves of Port Moresby's shops.

In March of 1979, a follow-up survey found that the proportion of breastfed children had risen from 65% to 88% and that the proportion of seriously undernourished infants had fallen from 11% to 4% over the same period. Among children who were still being bottle-fed (almost all of whom had a prescription) the incidence of malnutrition had been halved.

By 1982, Port Moresby General Hospital was reporting a considerable drop in the number of young infants admitted for diarrhoeal disease. In the paediatric unit, only one child has died of diarrhoeal infection in the five years since legislation was introduced.

Coming together at this time, these breakthroughs in both science and social organisation could soon be helping to save the lives of half the 40,000 young children who now die every day.* They could also prevent several million children a year from becoming mentally or physically disabled. And UNICEF would not be worthy of its name if it did not now make the strongest possible appeal to the world that a children's revolution could and should begin.**

In all of this, the national and international media, so often criticised for conveying only the immediate at the expense of the important, have made an indispensable contribution. Several thousand articles and editorials in newspapers and magazines, plus extensive coverage on television and radio around the world, have carried the message of hope to hundreds of millions of people. Other than the 'hard news' of world events, the story of the potential revolution in child well-being has been one of the most widely reported and analysed international news stories of recent

decades. The response of the public, world-wide, has revealed again the deep longing among ordinary people everywhere for a world in which children no longer suffer and die in numbers which are beyond the emotional embrace of the individual but which haunt the conscience of mankind.

In a relatively short space of time, therefore, the individual techniques which could bring about this revolution have been pioneered, their combined potential has been articulated, and the news of their availability has been warmly welcomed. But this is not enough.

*Paradoxically, the reduction of infant and child deaths by half would lead to a fall in birth-rates and the stabilisation of world population at an earlier date and at a lower level. Pages 60 to 63 of this report discuss the relationship between infant deaths and infant births.

** In May of 1983, the representatives of the 41 nations on the Executive Board of UNICEF formally endorsed the measures set out in the 1982-3 'State of the World's Children' report.

The Challenge

The fact that a major improvement in the health and well-being of the world's children *can* now happen does not automatically mean it *will* happen. And the challenge ahead is the challenge of translating the local successes which show that a child health revolution is a *possibility* into intensive national campaigns which will make that revolution into a *reality*.

That challenge is now primarily political rather than technical or financial. The evidence leaves no room for doubt that low-cost techniques are available to act as a springboard for this great leap forward for the world's children. Any government which now decides to make a serious commitment to saving the lives and protecting the health and growth of its children can now move towards that goal. And any government, institution, or individ-

dual in the industrialised world wishing to assist in that process also now has a clear opportunity to do so.

Money is important and more is needed. But a much greater need is the mobilisation of existing human resources and organisations behind this great cause. For a children's revolution cannot be accomplished through exclusively formal channels or by rigidly conventional means. In most nations, for example, official health services do not reach more than a quarter of the population. Bringing the benefits of recent breakthroughs to *all* children will therefore depend on the health professionals lending their expertise to much more far-reaching campaigns involving people, institutions, and channels of communication which go far beyond the present scope of the health services themselves.

3

Brazil: defeating polio

In 1979, poliomyelitis killed or crippled 2,564 children in Brazil. It was an average year. Immunization against the disease had been slowly expanding for 20 years. But it was still only reaching a small proportion of the nation's children.

In 1980, the government decided that progress was too slow and that something special had to be done. With the personal backing of the President, and with the support of all government ministries, the Polio Control Operation was launched, adopting the optional approach of two doses of oral vaccine six weeks apart.

So the second Saturday of June and the third Saturday of August were declared national vaccination days. Saturdays were chosen so that parents would be free to bring their children for immunization. June and August were chosen because they are two of the coldest months of the year in Brazil and therefore the easiest months to keep vaccines cool.

The logistical problems of immunizing all the nation's children on one day could only be overcome by involving every kind of organisation – community groups, peasant co-operatives, youth groups, women's groups, neighbourhood associations, the churches, the schools, and the army, as well as the health services themselves. In readiness for the two days, 90,000 immunization posts were set up across an area larger than Western Europe or the continental United States. And because the oral vaccine can be simply dropped into the child's mouth, the campaign did not have to rely on highly qualified medical personnel. Instead, an army of 320,000 volunteers was recruited for the campaign.

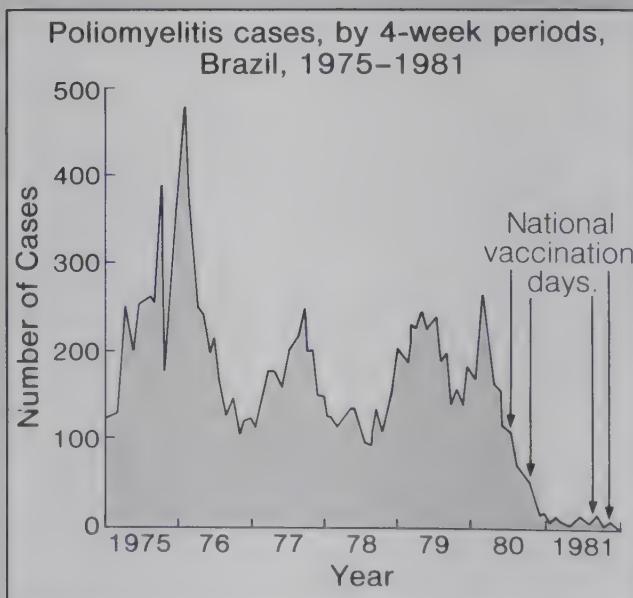
In the days and weeks before the two national vaccination days, the media took the immunization message into almost every home in Brazil. On the nation's 123 television stations and 1,200 radio stations, 30-second immunization broadcasts were made 20 times a day. In the major cities, the

print media gave space day after day for the campaign. In the villages, 3,900 loudspeaker services toured the streets broadcasting the same message and urging parents to turn up with their children on the appointed days.

Existing vaccination records were very poor and it was almost impossible to decide which children had been vaccinated and which had not. The solution was simple and workable – vaccinate them all. So in the fall of 1980, 18 million children were given the two doses of vaccine against polio. The chart shows the results.

The national vaccination days were repeated in 1981, 1982 and 1983. In September 1983, the total of confirmed polio cases among Brazilian children was 10.

Over 50,000 children are killed and half a million are crippled by polio every year in the developing world. If Brazil's immunization coverage were to be achieved by all developing countries, then this annual toll on the lives and health of the young could be reduced by 99%.



That is why the UNICEF office in India, for example, is helping to organise national workshops on the 'children's revolution' for leaders of labour and industry, agriculture and education, the media and the voluntary organisations. '*Experience provides conclusive proof*,' says UNICEF's Regional Director in New Delhi, '*that we must mobilise all organised resources if impact is to be accelerated*'.

'Mobilising all organised resources' is the key to unlocking the present potential for drastic improvements in the health and well-being of children. For the great barrier to be overcome is the lack of awareness among parents, communities, opinion leaders – and even some health professionals – about the means now available for saving and nurturing life. Overcoming that lack of awareness will require the help and involvement of all the 'myriad social, political, and professional groups which can, on large scale and small, act as channels of support and communication to reach out and help parents to use present knowledge and new techniques to ensure the survival, growth, and development of their children.'

'Organised resources' for promoting knowledge of these techniques can therefore include the paediatricians and the doctors; the nurses and the paramedics; the agricultural extension services and the community development workers; the parliamentarians and the local officials; the teachers and the schools; the colleges and the universities; the medical schools and the research institutes; the churches and the clergy; the mosques and the imams; the trade unions and the employers' federations; the lawyers and the engineers; the commercial communities and the women's associations; the voluntary organisations and the aid agencies; the environmental groups and the family planning organisations; the Boy Scouts and the Girl Scouts; the traders and the shopkeepers; the youth movements and even the children themselves (see panel No. 21).

Whether or not people and their organisations become involved on this scale will decide whether or not the children's revolution will realise its potential. Oral rehydration therapy (ORT), for example, can in theory save the lives of most of those five million young children who now die

each year from diarrhoea-induced dehydration. But if only 10% or 20% of children are in contact with modern health services, then many other channels will have to be used to put the ORT breakthrough at the disposal of the majority. And the fact is that ORT – which *The Lancet* describes as '*potentially the most important medical breakthrough this century*' – will not reach more than a small proportion of the children who need it unless it is also promoted through the primary schools and colleges; through the churches and the temples; through the women's nutrition classes and the work-place; through the water engineers and the extension workers; through the transistor radio and the press; through the television and the video-recorder; through the centres of culture and entertainment; and through every other channel which can reach out to help link present knowledge to people's needs.

This is the 'social breakthrough' which is every bit as important as the technical breakthrough itself if ORT – and the other main elements in the child health revolution – are to come anywhere near their dramatic potential for saving the lives and improving the health of millions of children throughout the world.

In almost all the places in the world where available 'solutions' are going into action on a scale commensurate with the problems, these social and communications breakthroughs are the visible – if varied – common factor:-

In Nicaragua, 80,000 volunteers – farmers, students, workers – are taking the message of ORT to every region of the country. In Honduras, intensive year-round radio campaigns have taught almost all women how to make an oral rehydration mixture. In Brazil, over 300,000 volunteers – drawn from women's groups, church organisations, peasant co-operatives – have helped to reduce polio by 99% in the last three years. In Costa Rica, radio, television, and press campaigns have probably been more important than the health services themselves in promoting public education about health and hygiene. In Colombia, priests are introducing lessons about immunization and ORT at pre-marriage and pre-baptism counselling sessions. In Haiti, attempts are being made to have sachets of oral rehydration salts sold in every

It can be done

It has sometimes been argued that direct attempts to reduce child deaths and improve child health are doomed to failure in the absence of overall social and economic development. But recent experience suggests that such direct campaigns can bring about significant improvements in the lives of children even in poor communities. At the same time, they can also help in the struggle towards longer-term change by protecting the normal mental and physical growth of the next generation.

Ten such projects (covering populations of 60,000–70,000) were recently examined in a study for the Overseas Development Council by Davidson Gwatkin, Janet Wilcox and Joe Wray.* The projects were chosen not for their apparent success or failure but for the completeness of their before-and-after records. Some of the results:-

- Four years after a major project was started in Imesi, Nigeria, infant mortality was down to 50 per 1,000 in the project area as opposed to 91 per 1,000 in nearby villages.
- In northern Peru, a health and nutrition campaign brought the infant death rate down to 48 per 1,000 as opposed to 134 per 1,000 in nearby areas.
- In Jamkhed, India, infant mortality in the small sample population surveyed had fallen from 97 to 39 per 1,000 over the five years of the project's operation.
- In Hanover, Jamaica, the infant mortality rate fell by 25 points between 1970 and 1975 as opposed to only a 3-point decline in Jamaica as a whole.
- In Narangwal, India, child deaths from diarrhoeal and respiratory infections (the two most common causes) were cut by 50% in 17 months.
- In a rural area of Guatemala, a five-year effort

reduced infant mortality rates from 150 to 55 per 1,000.

In almost all of these cases, child death rates (deaths of children aged one to four) also declined and, where records were kept, average weight-for-age among the children was improved.

The relevance of such campaigns is a function not just of their effectiveness but also of their costs. In seven of the cases studied, the per capita cost of the project was similar to, and in some cases lower than, the per capita health spending of the nation in which the project was set.

A study of the common elements in these successes does not yield any hard and fast rules other than the need for competent and dedicated staffs and management. But in all cases, improved nutrition for young children and pregnant women played a big role in lowering the rate of infant and child deaths. In Narangwal, for example, each 10% decrease in a young child's weight-for-age brought with it a much greater increase in the probability of death. Growth charts, pioneered with great success at Imesi and refined at Narangwal and Hanover, helped reduce child deaths and improve child health by making possible the early identification of children at risk.

Finally, the authors noted a less obvious common factor: '*A principal characteristic that seemed to distinguish the more successful from the less obviously successful projects,*' they concluded, '*was the degree to which they departed from the Western tradition of hospital-based, high-technology medical services in the search for approaches more appropriate to village conditions.*'

*Davidson R. Gwatkin, Janet R. Wilcox and Joe D. Wray, *Can health and nutrition interventions make a difference?*, Monograph No. 13, Overseas Development Council, February 1980.

village store and every neighbourhood corner-shop. In Nepal, small drug store owners have got themselves trained to give basic advice to customers who have no other health services. In the Yemen Arab Republic, 200 self-help associations funded by an Islamic community tax or *zakat* are beginning to provide basic health care to villages. In parts of Oman, one child in each school is trained to prevent trachoma among fellow pupils. In the Philippines, the staffs of maternity hospitals are becoming involved in educating all new mothers about the advantages of breastfeeding and the dangers of the bottle. In Bangladesh, 900 workers for the Bangladesh Rural Advancement Committee are visiting literally millions of families to bring the news about ORT. In Indonesia, 7,000 family planning workers have been re-trained to help teach mothers in 15,000 villages about the use of child growth-monitoring charts. In country after country it is this involvement and commitment of organisations and individuals which now offers the potential for both creating and sustaining a revolution in the survival and well-being of the world's children.

The challenge of the children's revolution is therefore a challenge for both governments and people. And for those who might doubt what ordinary people can achieve in the service of such a cause, it is worth recollecting that it is movements which have enlisted the commitment and caught the imagination of people which have brought about some of the greatest political and social changes of our times - the movement for political independence in the Third World; the movement for civil rights in the United States; the movements for the ending of unjust wars; for the protection of the environment; and for the rights of women.

In the past, such movements have been initiated and sustained primarily by those who were the victims of the wrong they sought to right. Children cannot start such a movement in their own defense. Yet in the last year alone the 15 million young children who have died in the developing world is the equivalent of the entire under-five population of the United States of America. On a European scale, it is as if the combined under-five populations of Britain, France, Italy, Spain, and the Federal Republic of

Germany had been wiped out in a year. And for every child who has died, another has been left blind or deaf or crippled or retarded. Could any cause be counted more worthy of a people's movement?

Recession

The 1980s may seem an unlikely time to be talking of a 'great leap forward' for children (see pages 69-70). An entrenched economic recession, and the lack of any present momentum towards a more just and workable world economy, mean that there is now very little realistic hope of any significant increase in the resources available for social progress during the remaining years of this decade.

Although pressure for accelerated growth and a more just and prosperous world must be sustained, the fact has to be faced that there will be very little social progress over the next decade if that progress is to depend mainly on increasing the financial resources available for it.

The central question for both industrialised and developing countries in the 1980s is therefore '*how can human progress be maintained in the absence of increased economic resources?*'

Faced with an analogous question during the oil crisis of the 1970s, the automobile industry responded by making cars lighter, engines more efficient, and styling more aerodynamic. In other words, progress was maintained by making better use of available resources. And for the maintenance of social progress in the 1980s, there is no realistic alternative but to apply that same principle. For the rest of this decade, 'making more of what you have' will surely be the first principle of progress.

In the industrialised world, this principle may not prove to be too penurious. In health, for example, the restriction on resources comes at a time when progress has become less dependent on advances in health technology and more dependent on 'costless' changes in the way we live. America's prestigious Center for Disease Control in Atlanta has recently stated that the average 50-year-old American male, for example, could add 11 years to his life expectancy through four 'free'

measures – not smoking, drinking alcohol only in moderation, avoiding obesity, and taking regular exercise. In other words, spectacular progress in health is still possible despite restrictions on resources.

In the developing world, on the other hand, there remain many fundamental needs which cannot be met without substantial economic progress. Two thirds of all the under-fives in the developing world, for example, still have no access to clean water.

Yet even in the poorer half of the world, doors are opening through which progress might still be made. And again, the way forward is lit by the principle of making more of what is available and finding ways to change the ratio between resources and results.

It is from this same principle that the present potential for improving the lives of the world's children now arises. Without new *ideas and strategies*, several million more children are going to die in the decade ahead than was thought possible even three short years ago, and many millions more are going to suffer mental and physical damage – unless a new way forward is found.

UNICEF believes that a new way forward for children in the 1980s is now available. Primary health care is the *idea* which makes this revolution possible. The spread of education, communication and social organisation is the *circumstance* which makes it practicable. Growth monitoring, oral rehydration therapy, the promotion of breastfeeding and expanded immunization, are the *techniques* which make it affordable even in the midst of recession.*

This report now turns to each of these three

elements. Together, they add up to a possibility – not an inevitability: and the difference is the will and commitment of governments and peoples to bring about this revolution in the well-being of the world's children. For this alone is the switch which could now set the current of action running through this circuit of unprecedented opportunity. A children's revolution is possible – if the world wants it.

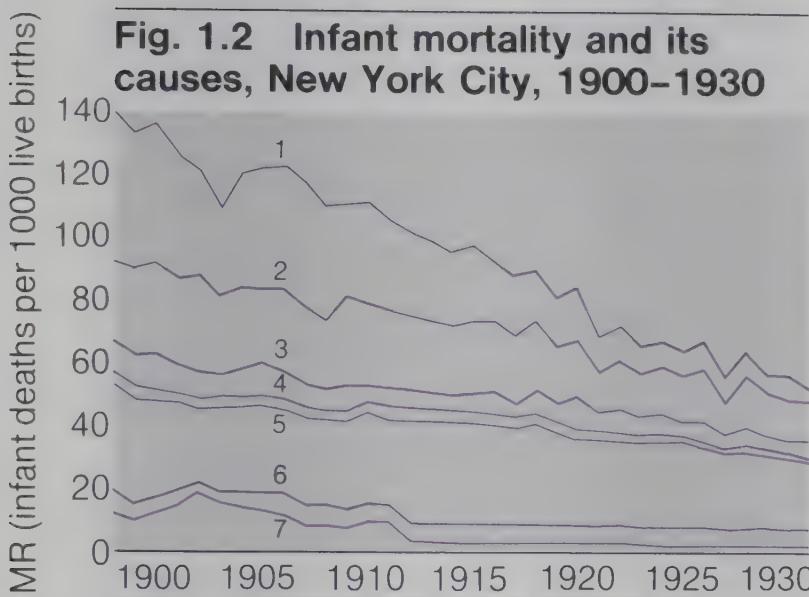
Waiting for development

As a statement of the need for a children's revolution, and as a measure of its progress, the infant mortality rate (IMR) is perhaps the most crucial of all available statistics. Technically, the IMR is the number of deaths below the age of 1 year for every thousand live births. But because it is a statistic which has as much to say about the quality of children's lives as about the quantity of their deaths, it is also one of the most eloquent indicators of development itself. That is why the new statistical appendix, attached to this year's report, lists the countries of the world not in rising order of their gross national products but in descending order of their infant mortality rates.

The justification for this central place given to the IMR in UNICEF's thinking is not just that an improvement in the lives of children is as important as, and not necessarily a function of, economic growth. It is that – unlike GNP per head, which can be increased significantly by the disproportionate wealth of a minority – the IMR can be substantially reduced only by improvements in the life and health of the majority.

A revolution in child survival and development can therefore most easily be measured by falling death rates for infants and children. In the past, the conventional wisdom has been that further significant improvements in the lives of children – and consequent reductions in the IMR – depend primarily on accelerated economic development. UNICEF does not accept that view. Whilst recognising the important contribution of economic growth to the lives of children, we also believe that the means are at hand to make the protection of the mental and physical growth of children into a cause as well as a consequence of economic advance. For we believe that there is a

*As a convenient mnemonic, these 'cutting edge' techniques are often referred to as GOBI-FFF – standing for Growth monitoring, Oral rehydration therapy, Breastfeeding, and Immunization – plus the equally vital but more difficult and costly elements of Family spacing, Food supplements, and Female education (see pages 49 to 60). There are, of course, other priority problems – especially malaria, intestinal parasites, iodine deficiencies and upper respiratory infections – and the precise mix of appropriate activities needs to be decided on in response to local problems and in consultation with local communities. The 'GOBI' elements are distinguished by being low in cost and universal in relevance.



Key

- 1 Digestive system (diarrhoea)
- 2 Respiratory infections, mostly pneumonias
- 3 Infectious diseases
- 4 Tuberculosis
- 5 Premature birth, injury at birth, other diseases peculiar to early infancy
- 6 Congenital malformations
- 7 All other causes

Source: New York City Department of Health, 1932.

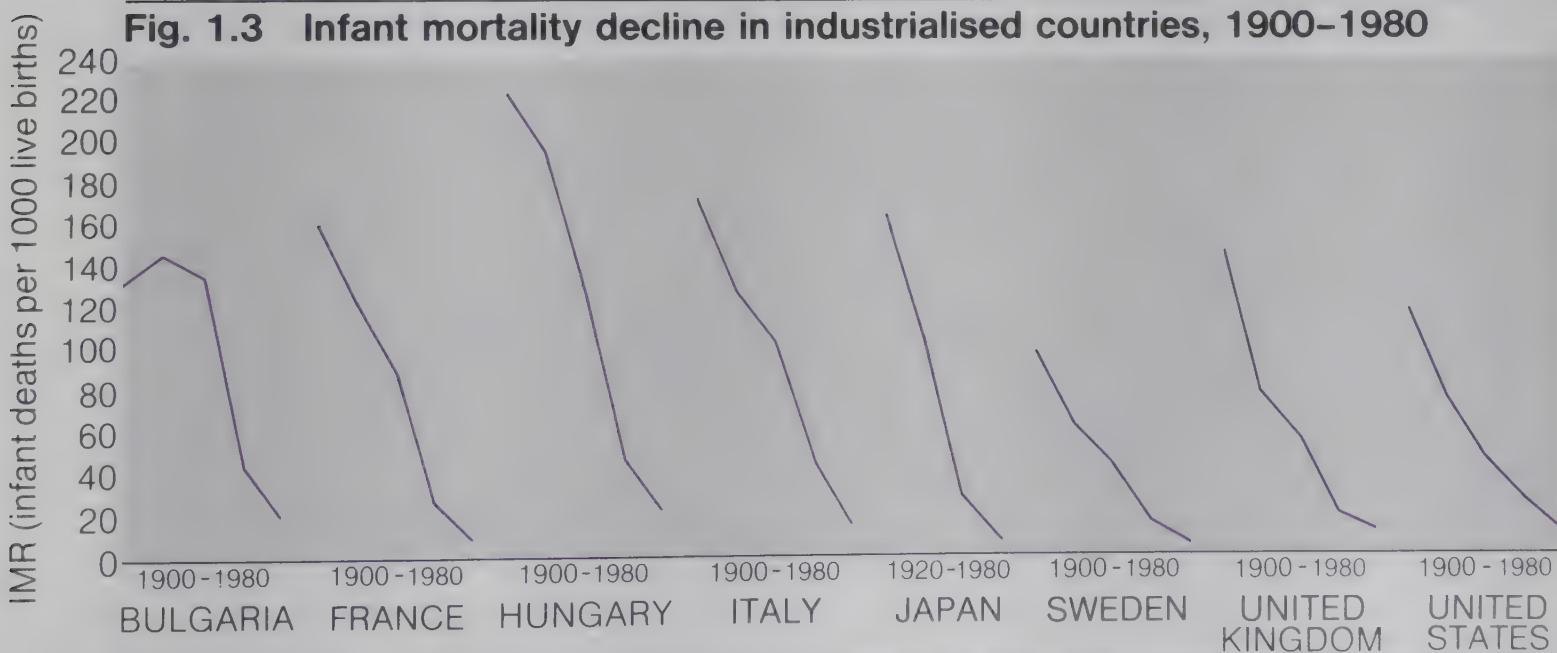
profound connection between the growth of the mind and the body in childhood and the growth of economies and the progress of nations.

Nonetheless, it is an illuminating argument, for it exposes the historical roots of the present case for a child health revolution.

Less than a hundred years ago the infant mortality rate in Europe and North America was as high as it is in the developing world now. In New York City in the year 1900, for example, the IMR was approximately 140 per 1,000 – about the same as in Bangladesh today. In the city of Birmingham, England, a survey taken in 1906 revealed an IMR of almost 200 per 1,000 – higher than almost any country in the world in the 1980s.

A look behind these statistics also shows that the main causes of infant death in New York and Birmingham *then* were very much the same as in the developing world *now* – diarrhoeal diseases and malnutrition, respiratory infections, and whooping cough (see Figure 1.2).

Over the next fifty years, infant death rates in the industrialised world fell more steeply than anyone would have believed was possible (see Figure 1.3). In New York, the IMR dropped from 140 to around 30 by the middle of the



Sources: 1. U.N. Demographic Yearbook, 1948, 1955, 1979, (supplement), and 1981.

2. B.R. Mitchell, European Historical Statistics, 1750–1970. Abridged edition. The MacMillan Press Ltd. 1978

3. Michael Haines and Samuel Preston. New Estimates of Child Mortality in the U.S. in 1900. Wayne Economic Papers. No. 141 October 16, 1981

Ethiopia: a city decides

In response to the present potential for a child health revolution, the City of Addis Ababa, Ethiopia, has decided to cut child deaths by half within the next four years.

With a population of 1.5 million, Addis Ababa is already one of the largest cities in Africa, and at its current growth rate the population is due to double within ten years. Though shanty towns have not mushroomed around Addis as they have done in so many other African cities, many parts of it are unplanned and overcrowded, with poor housing and little sanitation. There is no question that its children need health care: barely one in three children are vaccinated, and large numbers suffer from diarrhoeal diseases, tuberculosis, respiratory infections and malnutrition. Nearly 40% of all the deaths in the city are attributable to parasitic or gastro-intestinal diseases, and young children, as always, are the hardest hit.

The city is divided into 284 autonomous divisions, or city-dwellers' associations (*kebele*), which are due to play a key role in the accelerated health care programme; in each *kebele* one paid health worker and one unpaid will be trained to provide health services and to co-ordinate the effort as a whole.

The main thrust, however, will come from the *kebele* families themselves; and the effort to

educate and motivate them will draw on every available source – city council and *kebele* health committees, government ministries and university departments, the National Children's Commission, the Ethiopian Women's Institute, the Revolutionary Ethiopian Women's Association, and the Revolutionary Ethiopian Youth Association.

Specific goals have been set. The initial aim is to halve the infant mortality rate, from 150 to 75 per 1,000, within four years: all mothers and children under two are to be fully immunised; all mothers will be educated about oral rehydration and how to use it (plans are already afoot for the local manufacture of salts); and mothers will be trained to monitor the growth of all children under three, receiving nutritional advice and supplementary foods when these are needed.

In the second phase of the programme, directed at bringing infant mortality down to 50 per 1,000 by 1990, these measures will be complemented by regular food supplements for pregnant women and children and pre-natal and post-natal care for all who need it. And, most importantly, by work to make the *kebele* health system entirely self-sustaining.

Addis Ababa stands on the threshold of its own child health revolution. The plans are in place, and the political commitment is there. The next four years will tell if the hope becomes a reality.

century. And in the 40 years following that 1906 survey in Birmingham, the infant death rate fell from 200 to 46 per 1,000.

Throughout the industrialised world, the mainspring of this great leap forward was rising living standards – better food, water, housing, sanitation, education and income. Although the spread of maternal and child health care was undoubtedly an important factor, health technology and medical services played only a secondary role. Effective vaccines against measles, for example, only became available *after* child deaths from measles had been reduced to almost zero by better nutrition.

Around the middle of the century, or just before, infant deaths began a similarly steep decline in Africa, Asia, and Latin America. From around 200 per 1,000 in 1950, for example, the IMR in the poorer half of the world fell to around 100 by 1975 – a drop of 50% in only a quarter of a century. To most observers, it seemed as though

the developing world was following the path beaten by the industrialised world and it was confidently expected that infant deaths would continue to fall. As late as 1980, the General Assembly of the U.N. adopted the target of reducing infant deaths to 50 or less per 1,000 births in all nations by the year 2000.

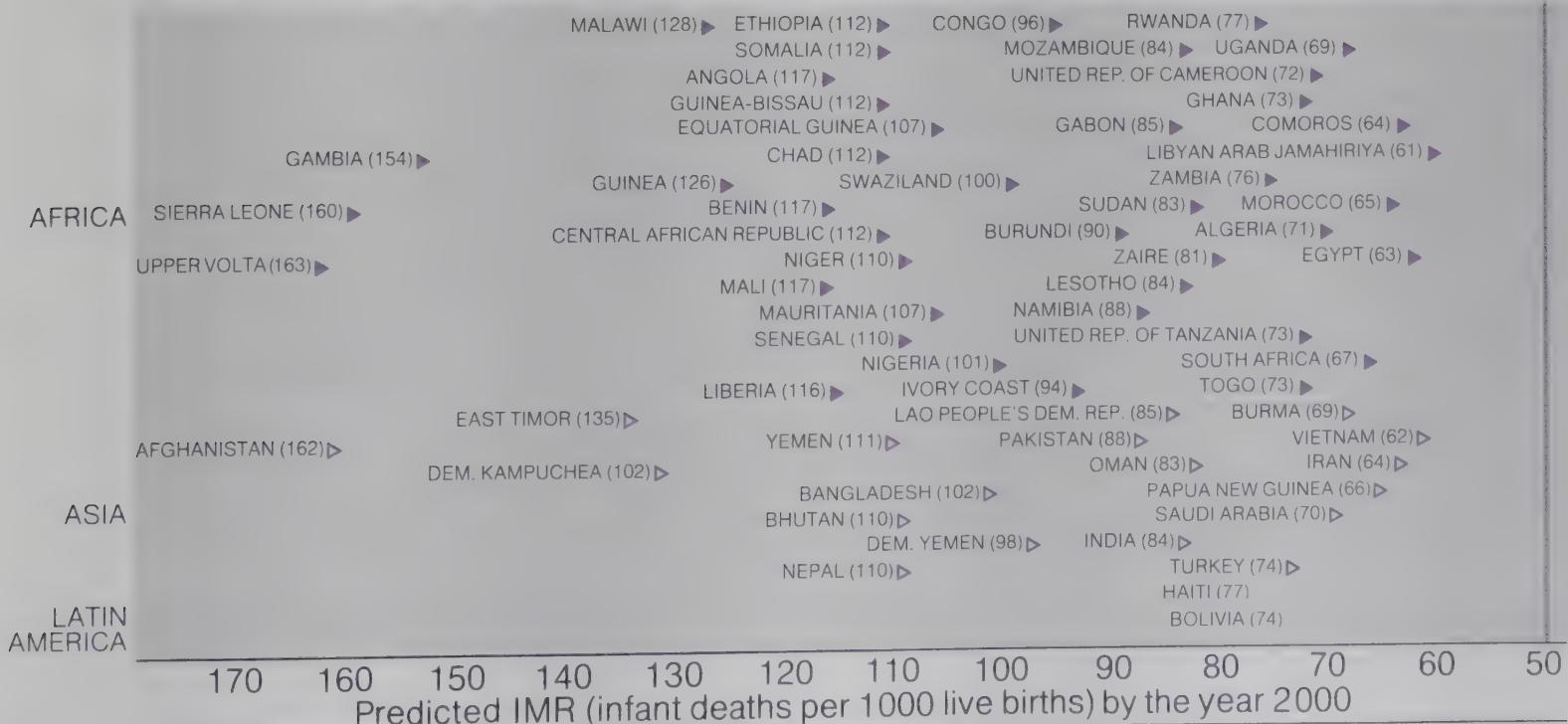
Unless there is a sudden acceleration of progress, that target will not now be achieved. Latest indications are that more than 70 nations will still have infant death rates considerably higher than 50 per 1,000 by the end of this century (see Figure 1.4). And in those 70 nations, 3 out of every 5 of the world's children are born.

What has gone wrong? Why is progress in child health slowing down? And why have infant death rates not continued to fall steeply in the developing world as they did in the industrialised world?

The different pattern of declining infant deaths reveals the different balance of forces at work behind the scenes in the two different worlds. In

Fig. 1.4 Countries unlikely to reach IMR of 50 by 2000 AD.

IMR TARGET 50



In 1980 the General Assembly of the United Nations adopted the target that infant mortality rates should be reduced to 50 per 1,000 or less in all countries by the year 2000. On present trends, the 62 nations above will all have infant mortality rates

of over 60 per 1,000 by the end of the century and are therefore highly unlikely to achieve the target. The position of each country indicates its expected year 2000 infant mortality rate, based on present trends.

Egypt: learning from failure

The 'Menoufia intervention' aimed to bring better health to the 1.4 million villagers of the Menoufia governorate in Egypt's Nile Delta. In particular, an attack was to be launched against the diarrhoeal diseases which were killing one child in every twenty.

By May of 1979, women with secondary school education had been recruited and trained in each of 105 villages. Over the next three months, these oral rehydration promoters visited 45,000 mothers to explain where to get and how to use the oral rehydration salts which, when mixed with the right amount of water, can prevent the deadly dehydration caused by diarrhoea.

The organisers of the campaign knew that they were not tackling the basic causes of infection. But plentiful water, safe sanitation, and home hygiene will take a long time. Meanwhile, 4,000 Menoufia children were dying every year from diarrhoea. And it had been shown in other parts of the developing world that oral rehydration therapy could save most of those children's lives. Privately, the organizers expected the Menoufia campaign to cut the child death rate by between a third and a half.

But it soon became clear that things were not going according to plan. And by the end of the first year, the death rate from diarrhoeal disease in the six 'treatment villages' remained at 55 per 1000 – the same as in villages untouched by the campaign. 'The conclusion that emerges,' wrote Belgin Tekce, the task leader in charge of research, 'is that the intervention was not effective in lowering death rates due to diarrhoea among children in the treatment villages.'

So what had gone wrong in Menoufia?

To find out, the organizers looked to the detailed information, gathered from mothers, on what exactly had happened in the last days and hours of

life for each of the 171 children who had died of dehydration during the year.

Gradually, an explanation began to emerge. In the treatment villages hardly any of the mothers had actually tried to use the oral rehydration salts in their own homes. Ninety per cent of all the mothers whose children had died had sought professional medical help – some of them even making two or three visits to a clinic. Once there, most of the children had been given tablets or injections or even intravenous feeding before they had died. Only a third of the mothers had been advised to try oral rehydration and by that time it had been too late.

In short, the whole Menoufia intervention rested on an educational campaign which failed. Questioned afterwards, most mothers were so uncertain about when and how to use the salts that they either didn't use them at all or used 'too little, too late'.

One reason for the failure, the organisers suspected, was that the young village women who had been responsible for promoting oral rehydration therapy had 'lacked credibility'.

The post-mortem also turned up one other likely reason. Neither the communities themselves nor the local doctors had been involved in the campaign. The result was that there was neither moral support nor practical help to encourage mothers to use oral rehydration therapy when their children became ill.

The moral of Menoufia is an obvious one. Having the right technology is only half the battle. Empowering mothers to understand and take charge of that technology to save their children's lives is another story.

In Menoufia itself, the lesson of year one has been learned.

the industrialised world, the dominant force was economic and social progress with medical services playing a supporting role. In most of the developing world, this pattern has been almost turned upside down. Newly-available interventions such as insecticides and antibiotics, transport and the control of mass famines, immunizations and epidemic control, have made the major impact; overall development and rising living standards took the supporting part. In India, for example, fully a quarter of the fall in child death rates was brought about by DDT-spraying campaigns against the malaria-carrying mosquito.

Sooner rather than later, progress based on such a pattern was bound to run up against its own inherent limitations. Modern medical services are too expensive for economically poor countries to provide to the majority of their people in such a short space of time; nor were such services designed to do battle with the great alliance of malnutrition and infection which was and is still the most important threat to life and health for the majority of families in the developing world today.

In consequence, the steep decline in infant deaths is now slowing down at a much earlier stage, and at a much higher level, than in the industrialised world. In the poorest countries, containing half of the world's people, average infant mortality rates are still reluctant to fall below 100 per 1,000 births* – as opposed to 20 or less per 1,000 in the industrialised nations today. And in the gap between an average IMR of 100 and an average IMR of 20, fall the bodies of approximately 40,000 children each day.

From this brief account of falling infant death rates in industrialised and developing worlds, it might seem reasonable to argue that only overall development can now re-accelerate progress for children and lead to further significant falls in infant death rates.

If that were true, then the outlook for the world's children would indeed be bleak. As the half-way point in the 1980s approaches, the high road to economic development remains almost impassable, blocked by world recession, by debt

crises, by declining terms of trade, by internal social disorder, by high unemployment, and by stagnating levels of aid. Meanwhile, progress towards a more just and workable international economic order remains becalmed.

To further darken this outlook, a glance down the too-long list of nations with high infant mortality rates despite their relatively high levels of GNP will demonstrate that there is nothing either rapid or automatic about the conversion of economic progress into tangible benefits for the poorest children and their families (see Figure 1.5).

So to accept the argument, and to wait for recession to step aside and allow economic development to resume its slow walk towards social improvement, is to accept that tens of thousands of children will continue to die each day and that millions more will live on in hunger and ill-health – a state of affairs which can and does undermine the very process of economic development itself.

What would these children say if they had a voice in world affairs? What would be their view about waiting for development?

These children do not die from exotic causes requiring sophisticated cures. Five million of them die in the stupor of dehydration caused by simple diarrhoea. More than three million die with the high fevers of pneumonia. Two million die marked by the rash of measles. A million and a half die racked by the spasms of whooping cough. Another million die with the convulsions of tetanus. And for every child who dies, many more live on in hunger and ill-health.

There has to be a better way forward, and there is.

The new road

In more recent years, a large body of evidence has accumulated to show that rapid progress in child health and well-being – including a further halving of infant mortality rates from around 100 to less than 50 per 1000 – can be achieved in low-income nations without waiting for GNP to lead the way. Pre-eminent among that evidence are the

*In some African countries, the IMR is above 200 per 1,000.

Egypt: halving deaths

The Menoufia experience (see panel previous page) painfully demonstrated an obvious truth: oral rehydration therapy can only reduce child deaths from diarrhoea if mothers are informed and confident about why, when and how the salts should be used.

It was a lesson well learned by the organisers of a second attempt to introduce oral rehydration into Egyptian villages. Leading the campaign was Dr. Sunny Salaam, of the University of Alexandria, and this time the team knew that what was on trial was not the treatment itself but their own ability to put the life-saving salts at the disposal of mothers.

In 1980, two more villages in the Nile Delta – Berket Ghatas and Kafala – were chosen. Each had a population of around 4,000. Careful advance study threw up vital details – like the fact that the commonest kind of drinking glass used in the villages held about 200 ml. For easy measuring of the right mix, that meant that smaller packets of salts were needed. A brand called *Rehydran* was the one finally chosen.

In both villages, sachets of *Rehydran* were made available in the normal government health clinics and volunteers visited every family every two weeks to check on cases of diarrhoea and advise mothers on what to do about it. But in one of the villages – Berket Ghatas – the promotional campaign went way beyond the boundaries of the health service.

In Berket Ghatas, *Rehydran* was sold in every corner shop and small village store as well as at the health centres. And for a full year, the community was blitzed with information about how to stop diarrhoea from killing children. Meetings were held with community leaders and religious figures as well as doctors. Talks were given in the market-places, in the washing yards, in the

schools, and at the festivals as well as at the clinics. Local entertainers were persuaded to include the *Rehydran* message in folk songs and plays. Cars toured the streets with public address systems blaring advice on oral rehydration. Everywhere, posters reinforced the message.

'In Berket Ghatas,' says Dr. Salaam, 'we went into the community because it is not just the mothers who decide what to do about diarrhoea, it is the fathers, grandparents, local healers, shop owners ... the whole community influences the way people think and act.'

By the end of the year, every mother in Berket Ghatas had heard about *Rehydran* and three quarters of them knew how to use it properly. When asked how diarrhoea should be treated, 87% of Berket Ghatas mothers said 'Rehydran' – as opposed to only 12% in Kafala, where no special promotion campaign had been mounted.

Most important of all, the number of child deaths in Berket Ghatas was more than halved by the oral rehydration campaign.

The basic causes of diarrhoeal infection – inadequate water, sanitation and hygiene – have not been changed in Berket Ghatas. That campaign is still to come. But Dr. Sunny Salaam believes that something equally fundamental has been changed by their work. 'This research has left something with this village,' she says, 'changed it in ways you cannot really understand unless you understand Egypt. Before, people did not even think of diarrhoea as a disease, or that it was not natural for children to die from it... But now, we have turned mothers into doctors. They are treating their own children. This change is more important than you can imagine, and to have made this change in people's lives is an accomplishment.'

historically significant examples of the People's Republic of China, Sri Lanka, the two Koreas, Taiwan, and Kerala. In all of these cases, the infant death rate was brought down to around 50 per 1000 or less at levels of economic development which were lower than the average for the developing world today. And in all of these cases, this dramatic progress was achieved at a level of GNP lower than \$400 per person. But all managed to reduce their infant mortality rates to levels far lower than the levels now prevailing in many middle-income countries where per capita GNP ranges from \$1500 to \$2300 a year. This ability to 'make more of what you've got' has not proven to be the prerogative of any one political or economic system. And nothing could show more clearly that drastic improvements in the health and well-being of a nation's children need not wait on, and do not depend on, economic growth alone.

Secondly, there is the recent evidence of direct attempts to improve child health and nutrition on a large scale and at a low cost in economically poor communities in many different parts of the developing world (see panel No. 4). Summarising the evidence of ten such attempts in the developing world, a recent study came to the no less than stunning conclusion that '*taken together, they represent a persuasive case that, in the hands of able leaders and in populations of up to 60,000 to 70,000, well designed and effectively operated projects can reduce infant and child mortality rates by one-third to one-half or more within one to five years, at a cost of less than the equivalent of 2% of per capita income – an amount no greater than that currently being allocated to health nationally*'.*

Examples such as these, on large scale and small, were the grist brought to the mill of the first International Conference on Primary Health Care which met in the Soviet city of Alma Ata towards the close of 1978. There, a new relationship between health and economic development began to be worked out.

The negative premise of Alma Ata was that

Western style health systems – on which so many developing countries had based their own health strategies in the immediate post-colonial period – were failing to meet the health needs of the majority and could no longer be looked to as the way forward. The positive impulse, on the other hand, was the realisation that new ways forward were now opening up – ways designed in, by and for the developing world, ways which held out the hope of a much greater improvement in health for much larger numbers of people.

The new ways forward were based not on highly specialised medical personnel working in expensive hospitals with sophisticated technology, but on active communities backed by appropriate technologies and well-trained paraprofessional development workers who were themselves supported by the full range of government services. Such community development workers, it had been shown, could advise on nutrition and water supply; help with hygiene and sanitation advice; organise immunization campaigns; distribute iron folate and vitamin A tablets; handle penicillin and other basic drugs; conduct anti-malarial and anti-parasitic campaigns; advise on family spacing and safer child-birth; deal with common local injuries and illnesses; and refer more specialised problems to more specialised people.

Surveying the hundreds of different versions of this theme brought to the Alma Ata Conference, it was possible to see that the developing world need not follow the same road to health as the industrialised world, that improvements in well-being need not wait upon the attainment of similar levels of economic development, and that the primary health care idea could now change the gearing ratio between health and wealth (see Figures 1.6 and 1.7).

In total, the governments of over 150 nations signed the Alma Ata Declaration on Primary Health Care (PHC). For some, it is so far only a paper commitment. For many, it marks the beginning of a new era in health. And it is that new era, as much as any breakthrough in knowledge or technology, which now makes a child health revolution possible.

In the last year, a major review of progress towards primary health care (conducted by the

*Davidson R. Gwatkin, Janet R. Wilcox, and Joe D. Wray, *Can Health and Nutrition Interventions make a difference?* Monograph No. 13, Overseas Development Council, Feb. 1980.

Kenya: restoring confidence

The health services in most developing countries reach too small a proportion of the people to bring about a child health revolution. For Dr. Miriam Were, who had long believed that Western-style health delivery systems were inappropriate to the developing world, that general problem suddenly became a very practical challenge when she returned to Kaimosi Hospital in her own home region of western Kenya.

After a preliminary survey of the most important health needs in the area, she concluded that three quarters of all illness could be prevented by community-based health care and health education. But she also anticipated what the main stumbling-block would be – an almost total lack of confidence among the people themselves. Local health practices, some of which were very effective, had been crushed by the coming of colonialism and subsequent Westernisation. Health care now had become the preserve of distant professionals. Rural communities, she found, often waited despondently for outside help before tackling even simple tasks.

Beginning in 1977, Dr. Were and her colleagues began trying to build a partnership between the professional medical services and community-based primary health care. Through the local village organisations and the tradition of the *baraza*, or public meeting, 243 communities in the region agreed to participate. Soon, 243 community health workers, selected by their own villages, were being trained by teams of 'facilitators' drawn from different government ministries. Usually, the workers were married women with children – chosen because they were trusted by their communities.

After training, they returned to serve those communities – covering a population of 120,000 people.

The community health workers are now able to teach the use of oral rehydration salts; dispense anti-malarial pills; deal with cases of scabies,

intestinal parasites, and eye infections; treat simple cuts or wounds; and refer more serious illnesses to the health centres and the hospital. To tackle the major problem of illness prevention, they now spend two days a week making home visits to teach the importance of taking children for immunization, going to ante-natal classes, breastfeeding and timely weaning, keeping food clean and washing hands, growing vegetables, protecting spring water, keeping kitchens and compounds clean, digging latrines, and filling in pot-holes where stagnant water breeds malaria-carrying mosquitoes. In each community, the priorities for health action are set by the community health committee, which is also responsible for paying the wages of the part-time community health worker and for liaising with the government health services.

Most important of all, the community health workers are attempting to rebuild confidence, to rebuild the idea of *lkhondo yivohela kwayo* (things you do for yourself will be done, things you leave for others might not).

In 1980, three years after the experiment began, a preliminary evaluation showed that the impact was already remarkable. The proportion of mothers bottle-feeding their babies had fallen from 34% to 2% in the three years. The number of those breastfeeding for longer than 12 months had risen from 65% to 93%. The proportion of fully immunized children had risen from 10% to 41%. Worm infestations had dropped dramatically, from 80% to 6%. The use of pit latrines had risen from 1% to 91% of households. The proportion of homes with stagnant water nearby had fallen from 85% to 15%.

The secret of this success, according to Dr. Miriam Were, is that medical and other professional services were not used in such a way as to crush the people's own confidence or alienate them from involvement in their own health problems.

World Health Organization) has found that 49 out of 70 nations studied have drawn up specific plans for implementing the new approach and that many have already trained large numbers of paramedical staff. In India, for example, 200,000 *Health Guides* have been trained since 1977 and a further 380,000 are scheduled to be trained over the next three years. In Latin America, Colombia now has 5,000 *Promotoras* and an almost equal number have been trained in the Dominican Republic.

The spread of such primary health care networks is an important thrust in the social and organisational breakthroughs which are the essential counterparts to the technological breakthroughs now available. But equally important are

the opening up of communications channels, the spread of education, and the rise in the numbers of organised communities, action groups, and volunteer organisations throughout the developing world.

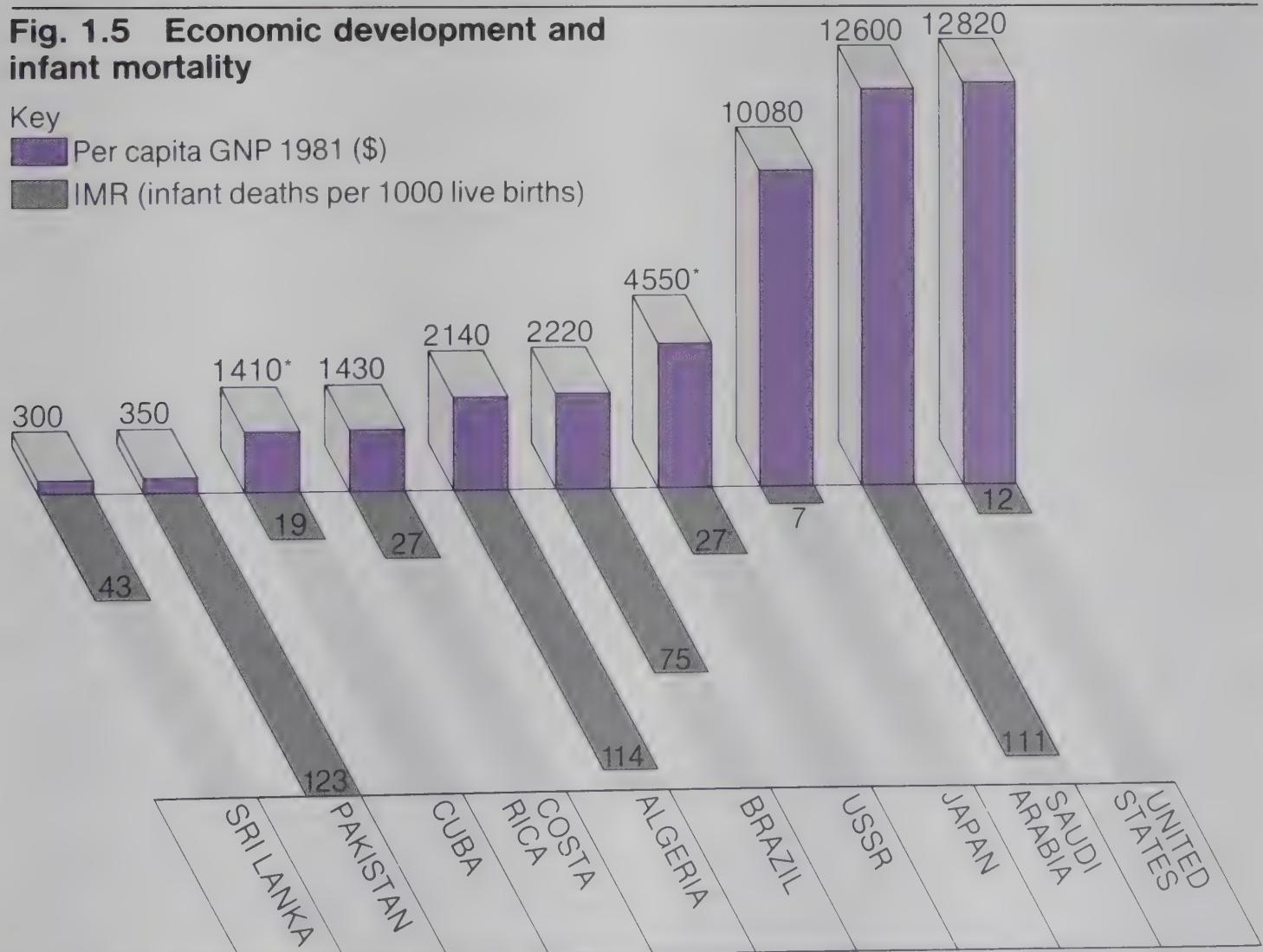
In Thailand, for example, almost 47,000 *Village Health Communicators*, all volunteers, are helping to spread new ideas about hygiene and health care. In Burma, there are now 16,000 unpaid *Community Health Workers* and their number is expected to double over the next four years. In Honduras, almost 1,000 *Health Representatives* are organising community action for health and 1,800 *Health Guards* are providing elementary care. In Niger, over 16,000 *Secouristes* are helping to provide health services to rural populations.

Fig. 1.5 Economic development and infant mortality

Key

Per capita GNP 1981 (\$)

IMR (infant deaths per 1000 live births)



Note: *Figures refer to 1980.

Source: World Bank, *World Development Report, 1982*

In addition to these growing armies of voluntary health workers, recent years have seen the increasing involvement of trade union movements, religious organisations, secular voluntary agencies, women's organisations, and youth movements – many of whom are now adopting development action as a common cause.

The sheer scale of all this activity is new. And combined with rapid increases in school enrolment, literacy, newspaper readership, transistor radios, roads and transport, it adds up to a new potential for mobilising human resources and putting low-cost techniques at the disposal of people's health.

Within this new potential, the priorities for action are best decided on in consultation with the communities concerned. Goitre, malaria, trachoma, and river-blindness, for example, are devastating in some communities and almost unknown in others.

But for the children – the children of almost every poor village and neighbourhood anywhere in the developing world – life and health are threatened by a common enemy. That enemy is the alliance of infection and malnutrition which strikes at the growth of both mind and body.

That is why the four actions outlined at the beginning of this report – child growth monitoring, oral rehydration therapy, expanded programmes of immunization, and the promotion of breastfeeding and better weaning – occupy a special place within the idea of primary health care and the circumstance of organisational breakthroughs. For they are the PHC actions which – at low financial and political cost – could bring the most benefits to the most children in most parts of the developing world. And together, they could break the grip of that terrible alliance.

In any community – rich or poor – the best food for an infant is its mother's milk. In any community, the most important single check on a child's normal healthy growth is its regular gain in weight. In any community, the best treatment for a child at risk of dehydration is the early administration of oral rehydration therapy. In any community, the best protection against six of the most dangerous diseases of childhood is complete

immunization during the first year of life. But in the developing countries, where so many individuals and organisations are now working to advance the cause of primary health care, these breakthroughs can be decisive:

- Because all four strategies empower parents to do the best they can for their children, they promote confidence and self-reliance.
- Because they are simple actions producing tangible results, they can generate enthusiasm for, and acceptance of, the wider cause of primary health care itself.
- Because they use appropriate technologies, they are available now and at low cost.
- Because they are involving rather than alienating, depending as much on community support as on professional expertise, they promote the very essence of the primary health care idea.

And because they address themselves to major causes of child illness and child death in almost all communities of the developing world, they have the potential to spearhead a revolution in the well-being of hundreds of millions of small children.

The sinister alliance

The potential contribution of these four main elements towards that child health revolution cannot really be appreciated without an up-to-date understanding of the main cause of illness and death among the world's children. For although the causes of most of those 15 million child deaths a year – and of an equal number of disabilities – are shamefully simple and ordinary, they are clouded in misconceptions which obscure both the problem and its potential solutions.

Perhaps the greatest of those misconceptions is that malnutrition is caused only by the lack of food. Intestinal parasites can cause malnutrition. Changing from breastmilk to commercial substitutes can cause malnutrition. Not knowing how and when to begin weaning can cause malnutrition. And in half or more of all cases, malnutrition is caused by infection.

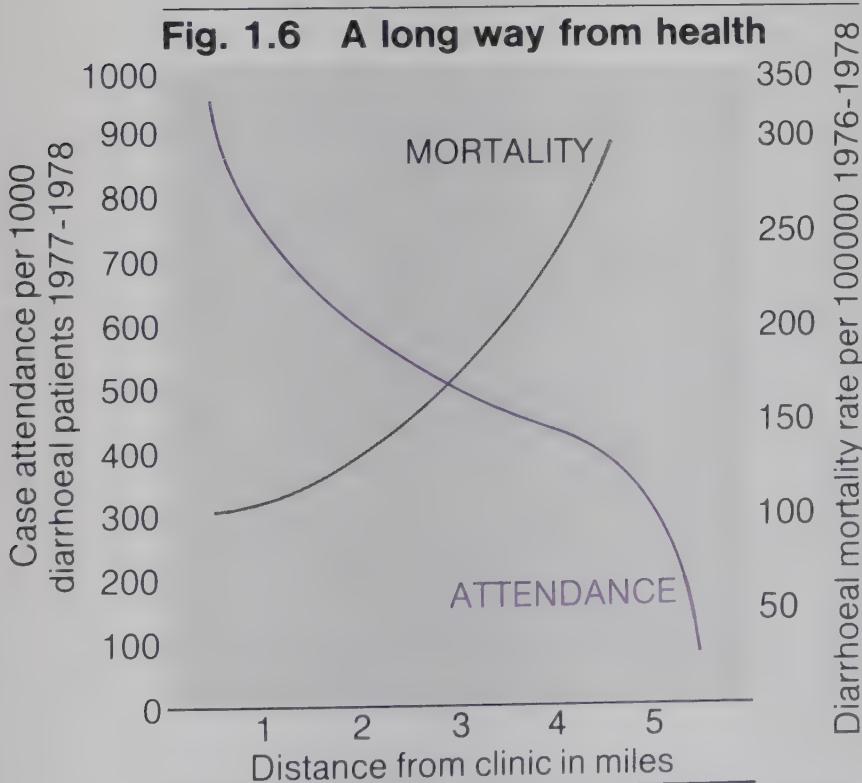
In practice, the relative weight of the two main

causes – malnutrition and infection – is less important than the synergistic alliance between them. Children with even moderate malnutrition, for example, have been shown to be three times more likely to contract diarrhoeal infections and up to 10 times more likely to die from illnesses like measles. But the infection itself is equally likely to be the cause of the malnutrition. All infections have a nutritional impact. They can depress the appetite. They can decrease the body's absorption of nutrients. They can induce rejection of food by vomiting. They can drain away nutrients through diarrhoea. They can induce mothers to stop feeding whilst the diarrhoea lasts.* And by any or all of these methods, infections become a major cause – perhaps the major cause – of malnutrition among the world's children.

But the question is not whether the setbacks to

*In many parts of the world, the usual reaction of the mother when her child has diarrhoea is to stop giving the child food and drink. Although this seems natural, it can assist both dehydration and malnutrition.

Fig. 1.6 A long way from health



Relationship between distance from clinic, attendance rates, and deaths from diarrhoeal disease (Teknaf Diarrhoea Clinic, Bangladesh, 1977-1978)

Source: Rahman, M.M. et al. A Diarrhoea Clinic in Rural Bangladesh: Influence of Distance, Age, and Sex on Attendance and Diarrhoeal Mortality. Am.J. of Public Health vol. 72, No. 10, 1982

the child's normal healthy growth are caused by inadequate food which lowers resistance to infection which causes further malnutrition – or whether infection induces malnutrition which in turn leads to more frequent infection. In practice, both malnutrition and infection are usually joined in a self-reinforcing cycle. And it is this cycle, by the very frequency of the attacks which it mounts on the vulnerable body of the growing child, which kills so many millions each year and impairs the normal mental and physical growth of so many millions more.

In the poorest areas of the world, for example, children average 160 days of illness every year. Usually, this will include three or four episodes of diarrhoeal infection, four or five respiratory infections, and one or more of the common childhood illnesses like measles. All of these will cause weight loss which takes time to recover from – and therefore all of them are setbacks to normal healthy growth. Measles, for example, claims 10% of a child's body weight in one quarter of all cases. Similarly, several diarrhoeal infections a year can reduce a child's rate of growth by half.

Almost all children suffer some setbacks to that rapid curve of growth which sees a normal baby's birth-weight doubled by about five months, tripled by one year and quadrupled by the age of two. But if those setbacks are frequent and severe, and if there is not enough time between them for the child to recover, then that smooth curve of growth begins to falter and break down.

With the rapid growth of brain and body which occurs in those early years of life, and with each stage of mental and physical development having its own time and place in that process, no child can afford too many such setbacks.*

In practice, the self-perpetuating cycle of malnutrition and infection means that one setback follows another with a frequency which disrupts normal growth during these vital early years. The

*Malnutrition and poor health have been shown to affect mental development both directly through physiological impact on brain growth and indirectly through lower energy and 'interest in life' at a stage when interaction with the environment, play and discovery, are important to a child's mental development.

Nepal: halving deaths

In 1982, the government of Nepal had deployed 714 full-time paramedics in 492 *panchayat* or district clinics. On taking up their posts, the first task of these intensively trained health workers was to visit every family in the *panchayat*. Thereafter, regular follow-up visits concentrated on teaching oral rehydration therapy to parents and on advising about nutrition, sanitation and hand-washing.

Since 1976, an additional 1,600 village health workers, with only six weeks of training, have been working in another 298 health posts in 23 out of Nepal's 75 districts. Their main tasks are to begin building integrated health services, calling on the support of different government ministries where necessary. In practice, they are involved in malaria surveillance, maternal and child health care, oral rehydration therapy, health education, leprosy and tuberculosis treatment, minor first aid, family planning advice and assisting in the organisation of vaccination campaigns.

Although there are still many difficulties, and

both the training and the back-up of the 1,600 village health workers could no doubt be improved, both of these primary health care approaches have rapidly shown their potential for improving health in Nepal. After only two years, a survey of four villages containing 6,000 households showed that infant deaths had fallen sharply. *In two villages covered by full time health workers in panchayat clinics, the infant mortality rate had been almost halved – from 123 to 65 per 1,000. In the two villages with village health workers, the mortality rate had fallen by a quarter – from 102 to 76 per 1,000.*

Commenting on the different impacts, the authors of the survey report pointed out that the health workers based at the *panchayat* clinics had been able to spend a considerable amount of time educating individual mothers about oral rehydration therapy. Village health workers, on the other hand, had to spread their time and effort over a much wider variety of tasks and over a much wider territory, meaning that less time was spent in supporting individual parents' efforts.

consequence, for hundreds of millions of children, is that never in their lives will they fulfil their own potential. And the result of that, in turn, is to set up another self-perpetuating cycle of poverty whereby children who do not fulfil their potential for either mental or physical achievement are thereby condemned to remain in poverty and bring up their own children in circumstances where the cycle may well begin all over again.

Nowhere have these inter-relationships been studied more intensively than in Narangwal, India, where the health of 35,000 people in 26 villages was studied by a team of 150 researchers over a four-year period. Its conclusion: '*It is now known that common infections precipitate malnutrition, which in turn reduces resistance. This facilitates further infections which again lead to increased nutritional deficit. If the sequence moves rapidly, the child dies – although neither malnutrition nor the infections by themselves would have caused death. When the sequence proceeds at a slower pace this combination is the major cause of chronic growth deficit, both physical and perhaps mental, in the more than 200 million deprived children in the world ... Nutritional deficits and associated lack of stimulation in early life interfere with both physical and mental growth. As a consequence, potential reduction through adult life in productivity and physical output represents a major limitation of human resources*'.*

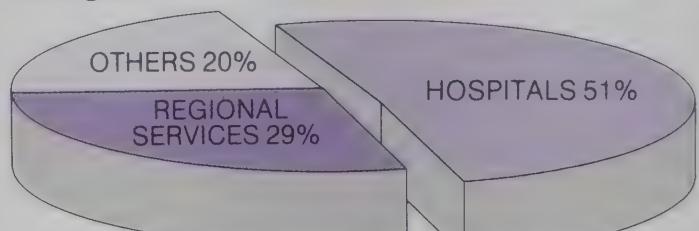
These two inter-connecting and self-perpetuating cycles, the one linking malnutrition with infection and the other linking one generation's problems to the next, rank alongside economic injustice and inequality as major causes and perpetrators of poverty and under-development. Indeed, they are closely allied to that inequality. For as the Director-General of the World Health Organization has eloquently expressed it: '*Malnutrition is both one of the causes of social injustice and one of the factors contributing to its maintenance. It reduces the capacity to learn during childhood and to earn during adulthood. The inevitable result is a downward spiral in which poor malnourished parents produce malnourished children who in turn will*

become poor and malnourished parents'.

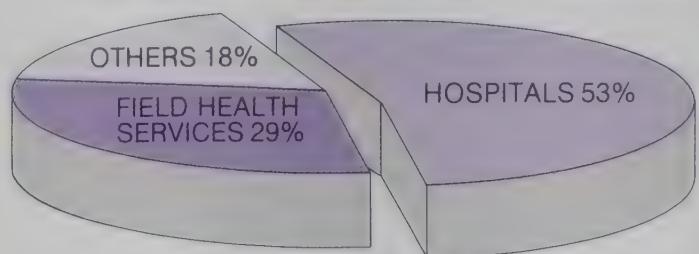
For the sake of the physical and mental development of children, and for the sake of the social and economic development of societies, that original cycle of malnutrition and infection must therefore be broken. Somehow, parents must be empowered, by all possible means, to reduce the frequency and severity of setbacks to the normal healthy growth of their children during those first few years of life.

It is in this context, the context of improved child well-being as a lever as well as a consequence of development, that the low-cost interventions now available could indeed be revolutionary. And it is to those opportunities that this report now turns.

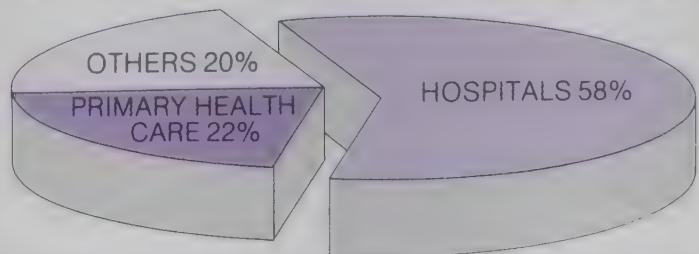
Fig. 1.7 Share of hospitals in health budgets



SENEGAL (1981/82)



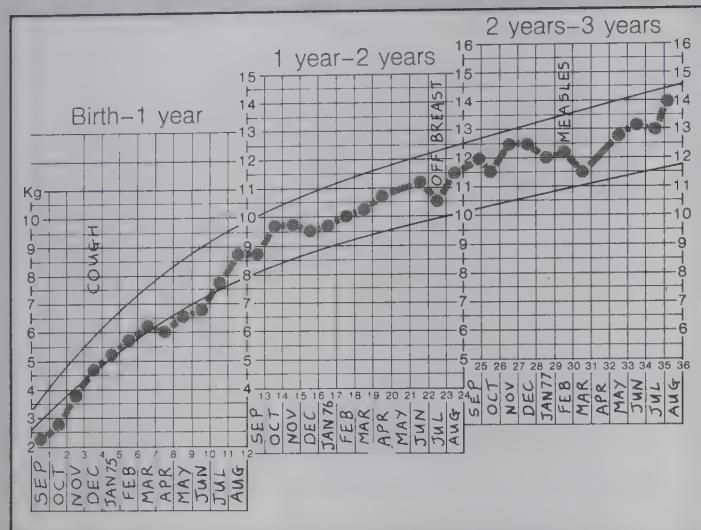
PHILIPPINES (1982)



TANZANIA (1980)

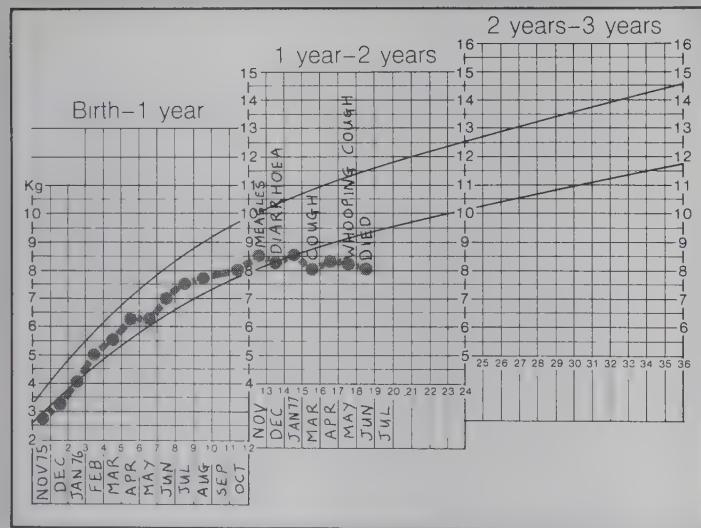
*From *The Narangwal Experience* currently being prepared for publication by the World Bank.

Growth Monitoring

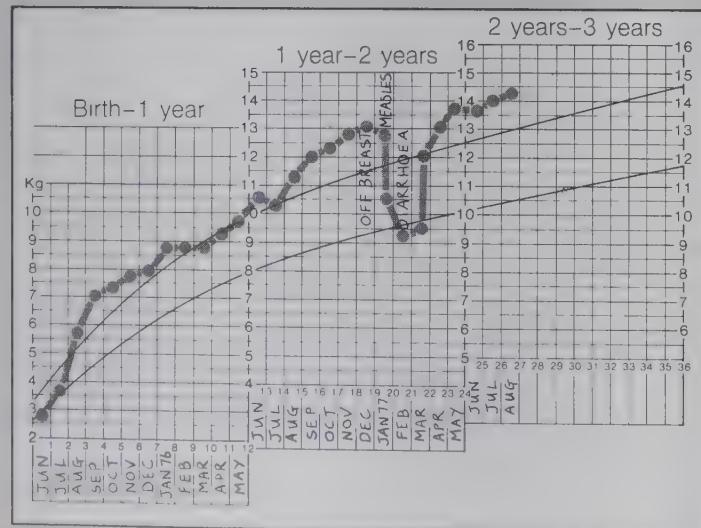


The charts shown here are reproduced from the actual growth charts of individual children. Around the edges of the charts—and on the reverse side—there are panels of advice on other aspects of child health—e.g. immunisation records and reminders, advice on when and how to use oral rehydration therapy, and messages about breastfeeding and weaning.

The child whose growth is depicted on this chart made good progress, despite set-backs at the time of coming off the breast and after a bout of measles. Weight loss was not allowed to continue once it had been detected by the chart.



This child—a boy—also grew quite well for a year. But then measles, diarrhoea, bronchitis and whooping cough struck in quick succession. With no time for recovery inbetween each bout of illness and weight loss; the sheer frequency of the set-backs finally proved too much and the boy died half-way through his second year. The cause of death was recorded as 'whooping cough'. But as the chart shows, the real cause was the combination of infection and malnutrition, each reinforcing the other.



This child progressed well until coming off the breast at about 18 months of age. Soon afterwards, she developed measles and lost more than a quarter of her body weight. Part of the weight loss was caused by dehydration. Without a growth chart, this serious setback might have gone unnoticed. As it was, extra feeding helped a satisfactory recovery and a rapid making-up of growth.

(original chart in Spanish)

Charts reproduced from 'See How They Grow—monitoring child growth for appropriate health care in developing countries'—by David Morley and Margaret Woodland, Macmillan Tropical Community Health Manuals, 1979

The Cutting Edge

Growth monitoring

Regular monthly weight gain is the most important single indicator of a child's normal healthy growth. But neither a mother nor a paediatrician can gauge that monthly growth by eye.

Only about 1% of the world's children are visibly and obviously malnourished. But more than a quarter of the developing world's children suffer from *invisible* malnutrition. And its very invisibility is one of the main barriers to its prevention or cure.

A detailed review of several hundred nutrition programmes conducted by the Harvard Institute for International Development, for example, recently concluded that: '*The average moderately malnourished child in the 6-24 month age range looks entirely normal but is too small for his or her age, has lowered resistance to infection, and therefore easily succumbs to illness. The child receiving only 60% of caloric requirement may give no outward sign of hunger beyond a frequent desire to breastfeed. In the Philippines study, 58% of the mothers of second and third-degree malnourished children said they thought their babies were growing and developing well.*'*

At the same time studies in several countries, including India, Pakistan, and Indonesia, have also shown that more than half of all cases of malnutrition are to be found in households where there is no absolute shortage of food. The reason why available food is not given to a malnourished child is usually that the mother does not know that her child is becoming malnourished and does not know that a child has special nutritional needs. And in many cases, the child's own appetite is depressed – often by the same illness which is causing the malnutrition.

Making the problem of malnutrition visible to the mother – the one person who cares most and can do most to prevent it – could therefore be one of the simplest but most important of all steps towards protecting and promoting the normal healthy growth of many millions of infants in those vulnerable early years.

For that task of making a child's nutritional status visible to the mother, an appropriate piece of technology already exists. Growth charts, costing less than 10 cents each, can show the mother whether or not her child is growing normally (see examples opposite). Regular monthly weighing and the entering up of the results on the chart reveal the vital information. And the accompanying message is simple: weight gain from one month to the next is good; weight constant is not good; weight loss is a serious danger signal.

Since they were first pioneered in West Africa by Dr. David Morley, growth-monitoring charts have been developed and refined in different regions of the world. Instead of being kept in the clinic by the health worker, many are now kept in the home by the mother. Instead of being printed on paper or card, some are now made of almost indestructible plastic. Instead of plotting the growth of each child against the curve of an average child, some charts now emphasise a normal *rate of growth* rather than a fixed idea of 'weight-for-age'. Instead of only recording weight and age, many charts also now show the dates on which a child should be immunized, record episodes of illness or clinic attendance, and carry advice about breastfeeding, weaning, family spacing and oral rehydration.

The main value of such charts is that they are practical and powerful educational tools for teaching mothers how to protect their child's healthy growth. With the chart, a mother can see progress or the lack of it, see the monthly weight gains or setbacks, see the downward falls from diarrhoeal infections and the upward jumps from extra feeding. The result of this visible symbol, this record and reminder, is the more informed involvement of the mother in the struggle for the health and growth of children:

- In Indonesia, 2.5 million infants and young children are being regularly weighed at the traditional monthly meeting of village women – and the results are being entered on growth charts kept by the mothers themselves.
- In Thailand, a programme based on the home use of growth charts by parents in several villages helped to completely eliminate third-

*Nutrition Intervention in Developing Countries, Harvard Institute for International Development, Oelgeschlager, Gunn & Hain, Cambridge, Mass., 1981.

Indonesia: charting 2 million

Despite rapid economic growth over the last 15 years, Indonesia – the fifth most populous nation in the world – still has an infant mortality rate of around 100 per 1,000 live births and half of all deaths in the country are the deaths of children under five. One of the underlying causes is that approximately a third to a half of Indonesia's children suffer from malnutrition.

In 1981, it was decided to see whether the very successful family planning organisation – an organisation including 7,000 trained field-workers and a network of village family planning posts staffed by thousands of volunteers – could also be used to help expand the government's family nutrition improvement programme.

By mid-1982, all 7,000 family planning workers had been retrained and were starting to launch the nutrition programme in 15,000 new villages throughout Java and Bali. The programme set for itself two simple and measurable aims: first, all children under three should gain weight every month; second, all children should weigh at least 11.5 kilos by their third birthday.

The surveys which had shown that up to 50% of children were malnourished had also thrown up one other crucial fact. There was often no difference in household income or economic status between families whose children were malnourished and families whose children were growing normally. Therefore it was decided that absolute shortage of food was not always the main problem.

The centrepiece of the campaign was a rainbow-coloured growth chart, specially designed after intensive market research, which was given to the mothers of 2.5 million children in 15,000 villages on the densely populated islands of Java and Bali. It was this card which was to measure the progress of each child towards the two simple goals of the campaign.

Instead of institutionalising the programme in clinics, the traditional village *arisan* or mothers'

meeting is used as the weighing point. With the common market-place scale, called the *dacin*, all children under three are weighed each month and the results entered up by the mother – sometimes with help – on her own child's chart. The charts themselves, cost approximately 5 cents. On the front cover is a picture of a middle-class Indonesian woman breastfeeding her baby. On the reverse side of the chart, panels contain information on how to make up oral rehydration salts and nutritious weaning foods.

But the main message of the chart is that monthly weight gain is good, constant weight is a warning sign, and weight loss is a danger sign.

In each village, the mothers themselves have selected *kaders* or nutrition volunteers who have then been specially trained by the family planning field workers.

Because the growth chart is kept in the home by the mother rather than in the clinic by the health worker, the means and the responsibility for 'good nutrition' are not taken away from the mother herself. And because the chart makes the child's nutritional level visible and intelligible to the mother, it is a powerful educational and communication channel for teaching mothers the relationship between food, illness, weight gain and health. Above all, the goals of the programme are understandable, measurable, and attainable.

Up to 2.5 million children are now being regularly weighed each month in Indonesia and the results are being regularly posted up on village notice-boards which show what percentage of the children have gained weight in the last month. From there, the information is fed into a computer in Jakarta which keeps track of the overall nutritional status of children. When the programme is evaluated later this year, it is hoped that malnutrition will have been reduced by up to 50%. By the end of 1984, the plan is to extend the family nutrition improvement programme to 40,000 out of Indonesia's 65,000 villages.

degree malnutrition and reduce second degree malnutrition by 44% during 1981-82 - even though no additional food was provided.

○ In Colombia, improvements in weight gain for a majority of children suffering from mild, moderate, and severe malnutrition have been achieved in poor communities by nutrition programmes incorporating the 'Carnet de Salud' or 'Health Card' kept at home by mothers.

○ In Jamaica, a systematic programme to improve the health and growth of over 6,000 young children using growth charts, immunization, nutrition education, and milk supplements, has resulted in a 40% decline in the prevalence of malnutrition and a 60% fall in infant mortality.

In India, the Narangwal study cited earlier concluded that the '*worldwide experience with "road to health" cards for recording weight gain has been reinforced by experiences at Narangwal showing that it is possible to help mothers learn that a child with faltering growth is a sick child. Growth monitoring therefore served both as an educational device and as the principal entry point for active nutritional supplementation. It is our belief that the most important long-term impact from our nutrition programme was in the education of mothers. The nutrition problems in the Punjab result mainly from inappropriate feeding practices and the heavy load of infections. Our results showed that it is a fallacy to assume that if food supplies are sufficient in a village, people will solve their own nutrition problems. In most developing countries, just as important as improving food supplies is the need for a major effort to help mothers learn how to make better use of food. Much of the childhood malnutrition could be ameliorated by nutrients that are already available in the village*'.

However helpful they may be, there can be no pretence that growth charts will protect the growth of children in the homes of the unemployed and the landless where absolute shortage of food may well defeat any intervention which does not include food itself. But in the significant number of homes where food is available but where children are still malnourished, the more than 200 different kinds of growth chart now going into use in over 80 nations can be one of the most powerful of all 'technologies' for enabling

parents to protect the healthy growth of their children.

Breastfeeding

For infants who are breastfed, the first six months after birth are often the healthiest time in their lives. Even in very poor villages, or in the slums of the cities, young infants are often sleek-limbed and shining with health. Collections of growth charts from different nations confirm this evidence-of-the-eyes and usually depict smooth and satisfactory growth until half-way through the first year of life.

More than anything else, this healthy start reflects the protection which breastfeeding offers to all infants. And it is no exaggeration to say that if breastfeeding were to be gradually replaced by milk-powders and feeding bottles among the low-income families of the developing world, then the battle to protect the normal physical and mental growth of the majority of the world's children would be lost (see Figure 1.9).

In recent years, a surge of research has shown that, as well as being more nutritious and hygienic, breastmilk also 'immunizes' the child and helps to fight off infection. Milk powders, by contrast, can be over-diluted with unclean water in an unsterilised feeding bottle which is often left to stand in the tropical heat. The result is that babies who are bottle-fed are many times more likely both to be malnourished and to contract infections - so setting up the cycle of malnutrition and infection at an even earlier and more vulnerable age. Some of the evidence:

○ In both India and Canada, separate studies have found that artificially fed infants were three times more likely to contract diarrhoeal infections and twice as likely to suffer from respiratory infections (the two main causes of child death) as infants who were breastfed.

○ In Chile, artificially fed infants have been found to be two-to-three times more likely to die in the first year of life.

○ In the Yemen Arab Republic bottle-fed infants have been found to be eight times more likely to be malnourished.

The Philippines: a hospital leads the way

Over the years, artificial feeding of babies had become accepted practice at Baguio General Hospital in the Philippines. New-borns were separated from their mothers at birth and fed with powdered milk in nurseries decorated with posters and calendars promoting various brands of infant formula. From time to time, representatives of the milk-powder companies came in to give a sales talk to the staff of the maternity wing and to restock the cupboards with free samples of milk powder for new mothers.

In April 1975, all that changed. Natividad Relucio-Clavano, Chief of Paediatrics at Baguio, returned to the Philippines after working for some time with Professor David Morley at London's Institute of Child Health. There she had become convinced that the decline of breastfeeding was one of the most serious threats to the health and lives of infants in the developing world.

'My training with Dr. Morley was a turning-point in my life,' says Dr. Clavano. 'I came back to the Philippines determined to start my own personal campaign for breastfeeding in Baguio City and the rest of the country.'

'I closed the door to the milk companies. We stopped giving our babies the starter dose of infant formula. Down came the colourful posters: in their place we hung the "baby killer" posters which show an emaciated baby inside a dirty feeding-bottle.'

Instead of being separated in a nursery, new-born babies were 'roomed in' – given to their mothers almost straight away so that breastfeeding could begin immediately.

As soon as the new procedures for rooming in and breastfeeding were instituted in the hospital, there was a noticeable drop in infant illness. But when a formal study was made to evaluate the effects of the change, the results were nothing less than startling.

Through all this, the hospital staff itself had to be convinced. Strongly supported by the Chief of Obstetrics, Dr. Clavano began a campaign of educating doctors, nurses and medical students, stressing that breastmilk is more nutritious, more hygienic, contains immunological and anti-infective agents, and is cheaper for both mothers and health services. Without the money and space and staff time required for bottles, teats, mixing the powder and sterilising, the maternity wing could run more efficiently and give more attention to the mothers and babies.

Comparing 4,720 babies born during the two years before the change was made with 5,166 babies born during the two years after the change, it was found that the incidence of clinical infection had fallen by 88%, the incidence of diarrhoeal infection had fallen by 93%; and the incidence of infant deaths had fallen by 95%.

Over the whole four-year period, 67 babies died in the hospital. All but two had been bottle-fed. 38 of the babies who died were victims of diarrhoea: all had been bottle-fed.

Dr. Clavano is now working to make the eloquent message of Baguio heard across the Philippines.

Dr. Clavano writes about the Baguio experience in her essay on The Promotion of Breastfeeding (see pages 86 to 92).

- In Central and South America, studies in several countries have concluded that infants breastfed for less than six months (or not at all) were five-to-ten times more likely to die in the second six months of life than babies who were breastfed for six months or more.
- In the United States, a study in New York State has found that bottle-fed infants were hospitalised three times more frequently than breastfed infants during their first year of life.
- In the Philippines, the decision to encourage breastfeeding instead of bottle-feeding of newborn babies at Baguio General Hospital reduced clinical infections by 88%, diarrhoeal infections by 93% and infant mortality by 95% (see panel No. 11).
- In Papua New Guinea, severe malnutrition among the children of Port Moresby fell from 11% to 4% after a promotional campaign and a ban on over-the-counter sales of feeding bottles had increased the incidence of breastfeeding from 65% to 88% (see panel No. 2).
- Surveying a total of 33 comparative studies of breast and bottle-feeding in different parts of the world, Dr. Anne Hill of the London School of

Hygiene and Tropical Medicine has concluded that the risk of death in infancy was three times higher for 'mixed-fed' babies (both breast and bottle) and five times higher for babies who are exclusively bottle-fed.

Despite this avalanche of evidence, there are alarming signs that breastfeeding is declining in many parts of the developing world.

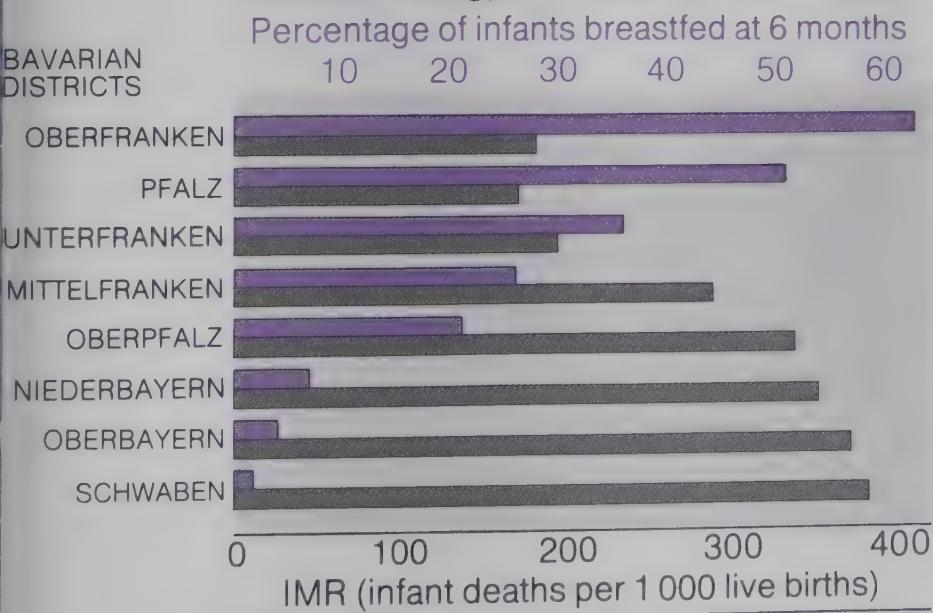
In Brazil, the proportion of babies being breastfed at the age of one month has fallen from almost 100% in 1940 to less than 20% in the relatively affluent south and to less than 5% in the city of Recife in the needy north-east. (These figures pre-date the recent and massive campaign to promote breastfeeding in Brazil). In South Korea, prolonged breastfeeding has fallen from 55% of first babies to 35% in 20 years. In urban areas of the Philippines, the percentage of mothers breastfeeding fell from around 80% in 1957 to less than 10% in 1977.

Adding this evidence of the decline in breastfeeding to the evidence of its clear advantages, shows a drastic and unnecessary increase in both malnutrition and infection for millions of the world's young children. Campaigns to defend and promote breastfeeding, and to stop the spread of artificial substitutes, are therefore an indispensable underpinning of a child health revolution.

Such campaigns are now gathering momentum. Since the adoption by the 1981 World Health Assembly of the 'International Code of Marketing of Breast-milk Substitutes',* over 100 nations of the world – including countries like Brazil and the Philippines where breastfeeding has declined steeply – have started the process of changing hospital practices, adopting marketing codes, and protecting infants from the threat of commercial baby-milk promotion. In eleven nations, all advertising of breastmilk substitutes to the public has been banned and in some the distribution of free samples of infant food in maternity hospitals has also been prohibited.

At the moment, it is not clear whether this battle to reverse the trend towards bottle feeding

Fig. 1.8 Infant deaths and breastfeeding, Bavaria, 19th century



Source: J.D. Wray. *Feeding and Survival: Historical and Contemporary Studies of Infant Morbidity and Mortality.* (Background paper prepared for WHO/UNICEF meeting on Infant and Child Feeding. 9-12 October 1978.)

*The Code was drafted by WHO and UNICEF in consultation with concerned industrial, consumer, and professional bodies.

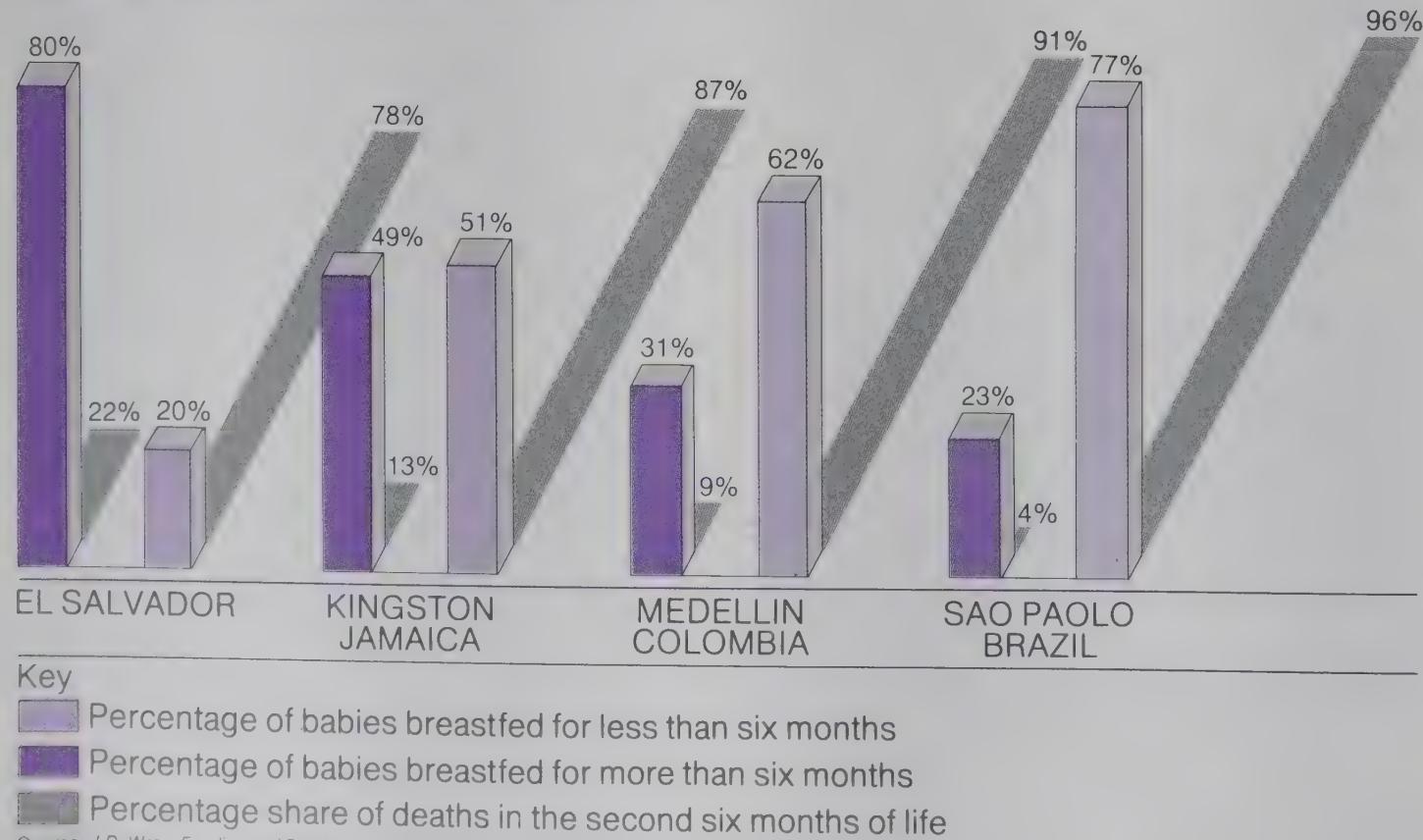
is being won or lost. But if the trend is to be arrested, and if breastfeeding is to play its part in the child health revolution, then the campaign to promote its advantages will need to take root in the community as well as in the health services.

Present knowledge about the dangers of bottle-feeding should saturate every pore of the health services from paediatricians to paramedics, medical schools to maternity hospitals. But influential as these prestigious groups are, it is clear that the health services alone cannot give this campaign the outreach it now needs. Community groups, religious organisations, trade unions, the commercial community, women's associations, political parties, primary and secondary schools, the mass media, and other government services all have a part to play. In the Brazilian campaign, for example, the arguments in favour of breastfeeding have been put not just to all members of the health services but to all members of the public.

In a 45-day information campaign all major newspapers, 100 TV stations, and 600 radio stations, took the message into almost every household in the country. Summaries of that same message also went out on bank statements, electricity bills, and even lottery tickets. At the same time, one and a half million pamphlets on breastfeeding were distributed to health centres and over 140 women's groups in six states launched educational campaigns. In the schools themselves, 15 states are now including information on breastfeeding in their regular curricula.

In the industrialised world, the recent and rapid return to breastfeeding – a movement which has usually been led by women in the higher-income and education groups – is to be welcomed both for the advantages it brings to children and for the influential example which it sets before the rest of the world. A little more than ten years ago, only about 30% of mothers in Northern Europe were breastfeeding their babies. In Sweden, Norway,

Fig. 1.9 Breastfeeding and child survival



Source: J.D. Wray, *Feeding and Survival: Historical and Contemporary Studies of Infant Morbidity and Mortality*. (Background paper, prepared for WHO/UNICEF meeting on Infant and Child Feeding, 9-12 October 1978.)

and Finland today, the figure has risen to over 90% (see Figure 1.10). Similar reversals are being recorded in many other nations including Australia, New Zealand, Denmark, France, Japan, Spain and the United States.

The reason for the return to breastfeeding in the industrialised world is the scientific discovery of its many advantages, the rapid communication of that knowledge to almost every family, and the equally rapid acceptance of that knowledge by more educated and better-informed mothers. Now, that same knowledge must be made available in the developing world – and among low-income families in the industrialised world – where millions of mothers are using breastmilk substitutes which they do not need, cannot afford, and are unable to safely use.

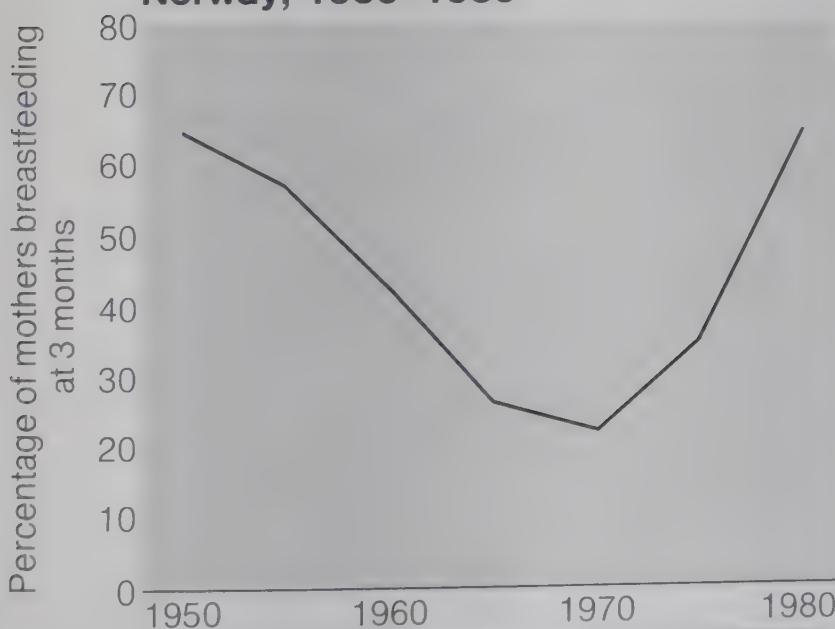
Often without clean water, or refrigeration, or sterilising equipment, or fuel and time for boiling, or enough money for adequate quantities of powder, or enough education to read the instructions on the tin, the poor communities of the world cannot afford to make the same mistake as the industrialised nations.

There is one element of this growing campaign which poses fundamental difficulties but which

cannot under any circumstances be ignored. To advocate breastfeeding is to advocate that mothers be available to suckle their infants every few hours of every day of every month for a year or more and to do this for several children over several years. To ignore that fact would be to turn the campaign to promote breastfeeding into another example of society applying the pressure of expectation on women without offering them even the semblance of support. Therefore that campaign must also concern itself with the issues of paid maternity leave; job security during pregnancy and childbirth; facilities for child care and breastfeeding at the work-place; provision of nursing breaks without loss of pay; technologies to lighten women's work-loads; community education about the processes of pregnancy, lactation and weaning; and changes in hospital procedures.

Finally, the informed support of the community in general – and men in particular – could do much to improve maternal and child health by understanding and accepting the fact that pregnant and lactating women need to work less and eat more. Because it is the mother who does most of the work involved in bearing and caring for children, there is a tendency to talk about child health and growth as if it were the responsibility of the mother alone. But the truth is that few things could make such a significant improvement to the lives of women and children as men knowing more and doing more about the raising of their young.

Fig. 1.10 Breastfeeding in Oslo, Norway, 1950–1980



Source: Elisabet Helsing, *Infant Feeding in Norway, A Preliminary Overview*. Report to the WHO Regional Committee 1981, Oslo, 1981, p.2.

Oral rehydration therapy

As the half-way point in the first year of life approaches, one of two evils begins to undermine the normal growth and weight-gain of tens of millions of the world's infants. The first is that the mother will not begin to give her baby other food in addition to breastmilk. The second is that she will.

From the age of five or six months, breastmilk alone is no longer sufficient to meet the needs of a growing child. If supplementary feeding is not now introduced, then growth slows down, weight-gain falters, and resistance falls. Not beginning to add supplementary foods at this time therefore

Barbados: promotion fails

In 1969 a national food and nutrition survey carried out in Barbados revealed that very few mothers were breastfeeding their young babies. Anxious to reverse this trend, the country's health professionals took action. Bottles were banned from the maternity wards of Queen Elizabeth Hospital, where more than 90% of Barbadian children are born, and so were the 'milk nurses' who promote bottle-feeding. Mothers and mothers-to-be were given intensive education about breastfeeding in health centres and clinics and through the mass media.

Twelve years later Barbados carried out another survey; the sample included 126 mothers with babies less than a year old, who were questioned about their views on infant feeding.

At first glance the stepped-up educational campaign seemed to have worked. More than 90% of the mothers interviewed in 1981 had made the decision to breastfeed before the baby was born, and 70% said they had been well briefed in prenatal clinics. Nearly 70% of them recognized the value of feeding during the initial colostrum period (as compared with only 30% of mothers in the 1969 survey). All in all, fully 85% of the mothers were convinced that breastfeeding was good for the child.

But when the questioning shifted from what the mothers knew to what the mothers did, a different and more disturbing story began to emerge. Only 45% of them were still breastfeeding at three months, and at six months the figure was less than 20%.

Clearly, something had gone wrong: nine out of ten mothers had planned to breastfeed, but fewer than two in ten were breastfeeding six months later. Barbados' labour legislation allows three months' maternity leave on half-pay, which should enable working mothers to breastfeed at least for those three months; but even at three months only

half of the mothers who had meant to breastfeed were doing so.

Some clues to the paradox can be found in the mothers' situation at home. Nearly all of them were receiving child support from their baby's father, but only half of them were actually living with him. A breastfeeding mother needs to be readily available for her child, and this is not easily arranged when she has to run a household with insufficient assistance from a live-in husband or relative.

The difficulty worsens if she needs employment as well. Two out of five of the sample of Barbados mothers were employed; but not only did they have to return to work early (after only four to six weeks of leave), they also returned to work-places which did not encourage or even permit breastfeeding. Many of the remaining mothers, though not technically employed, were almost certainly doing some kind of work to eke out their income; they, too, were caught in a trap – between their wish to breastfeed and the need to work, in a social climate that does not look kindly on breastfeeding away from the home.

In the circumstances, it is no wonder that the mothers gave up. When they were questioned about it they said that they did not have enough milk (irregular feeding curtails the flow of breast-milk), and they said that they wanted their babies to get used to the bottle so they could easily be fed by others.

The children in Barbados lost out on the advantages of breastfeeding – not because their mothers lacked understanding, but because the support system that working mothers need was inadequate. Guaranteed, fully paid maternity leave, arrangements for home help, day-care centres or crèches near the work-place, nursing breaks at work – all these are also needed if working mothers are to be able to breastfeed their children.

pushes the child towards the edge of the vortex of malnutrition and infection. Yet in many countries, including India and Bangladesh, more than a third of all infants are still being exclusively breastfed even at the age of one year or more. At that point, malnutrition is the certain result.

If, on the other hand, supplementary foods are introduced at the age of five or six months, then the risk of infection and malnutrition is almost as great. For as a child is weaned from the breast on to other food and drink, so it is weaned into increasing contact with an outside environment which may well include unsafe water, contaminated foodstuffs, unhygienic sanitation and uncontrolled infection. Weaned or unweaned therefore, it is at this point – mid-way through that first year – that so many millions of young children slip into the downward spiral.

To keep a child growing normally, there is no question that the introduction of supplementary foods must begin at this time. So help for the mother – help in weaning her child safely – is the next obvious fulcrum against which leverage for improvements in child health and growth can be exerted.

For most infants in most parts of the developing world, the greatest danger of the weaning period is the danger of dehydration induced by diarrhoeal infections. A study in the villages of Guatemala, for example, has shown that the incidence of diarrhoea increased sharply in the second six months of life and rose to become twice as likely in the second year as in the first.

To protect the child from diarrhoeal infection is a task which no mother can accomplish alone. For it involves an armoury of deterrents – health and nutrition education, more and better weaning mixes, more hygienic preparation and storage of food,* more water and safer sanitation, improved domestic and personal hygiene,** and immunizations against diarrhoea-inducing infections like measles.

Action on all of these fronts is obviously

necessary – and not just for the prevention of diarrhoea. But in the meantime, dehydration continues to claim the lives – and strike at the growth – of millions of children in almost all communities of the developing world. Mothers therefore need help *now* if they are to protect the health and growth of their children through the vulnerable years. Thanks to one of the simplest but most important breakthroughs in the history of science, that help may now be at hand.

Diarrhoea itself is so common in the developing world – with an estimated 500 million children suffering the infection three or four times a year – that most parents regard it as just a normal part of growing up (see Figure 1.11). Normally, the infection cures itself in a matter of days, but in about 10% of all cases, something starts to go seriously wrong.

Perhaps feeding stops – the natural reaction of most mothers when a child has diarrhoea. Perhaps the child just won't eat – the appetite depressed by infection. Or perhaps the child's powers of recovery are already at a low ebb. Whatever the cause, the infection persists and the fluids continue to drain from the body. Soon, 5% of the child's body-weight is lost. Even now, most children will recover – though their growth will have received another serious setback. But for some, the diarrhoea continues.

In a matter of hours now, the child's skin begins to lose its resilience and the thirst becomes unbearable, though the child may not have the energy to express it. Without urgent treatment, 10% of body-weight is soon lost. Now shock sets in, and stupor. Blood pressure begins to drop. The pulse quickens. Within minutes the kidneys begin to malfunction. Acids build up in the body. Peripheral blood cells begin to collapse.

One out of every 20 children born into the developing world dies like this before reaching the age of five.

Until recently, the only effective treatment recommended for dehydration was the intrave-

*Recent research findings challenge the conventional wisdom by suggesting that contaminated food is more important than contaminated water in the transmission of diarrhoeal disease.

**Studies have shown that more frequent hand-washing with soap and water after using the latrine and before handling food reduces the incidence of diarrhoeal infection by between 20% and 50%.

Nicaragua and Honduras: ORT cuts deaths

Because child diarrhoea and the malnutrition that goes hand in hand with it were such deadly scourges in Nicaragua, UNICEF's emergency assistance at the end of the civil war in July 1979 was concentrated on oral rehydration. Twenty-three oral rehydration units were established, with trained staff distributing oral rehydration salts free of charge and teaching mothers how to mix them at home. The units soon showed their effectiveness, and the emergency effort rapidly turned into a priority national programme.

The government used every available means to inform the public about oral rehydration. All the mass media were co-opted. The campaign was splashed across billboards, and leaflets, comic books, and posters were distributed nation-wide. The 80,000 young workers of the mass literacy campaign carried the message to every part of the country, along with the advice to continue feeding children during diarrhoea. Monthly reports from the oral rehydration units were widely circulated so as to dispel any doubts the medical profession might have.

By 1982 there were 334 units in operation, with a steady stream of child patients – more than 300,000 so far. *And diarrhoea has fallen from first to fifth place as a killer of Nicaragua's children.*

In Honduras, likewise, diarrhoea has traditionally been the foremost cause of infant and child

mortality, and an intensive public information campaign has been mounted to combat it.

Radio was the principal channel for the Honduran campaign. One 60-second radio spot – a song extolling the benefits of breastfeeding – quickly became a national hit; it was always followed by an announcement urging the use of Litrosol, a locally-packaged brand of oral rehydration salts. Other radio spots, some of them humorous, covered related topics such as the importance of hygiene in preparing a child's food.

Distributed simultaneously with the radio campaign was a large poster of a mother breastfeeding her child, complete with rose, laurel and the campaign emblem of a red heart. Other eye-catching posters gave instructions on why and how to use Litrosol.

Mayors, midwives and health workers were given stocks of Litrosol packets and they raised flags outside their homes, displaying the red heart, to identify them as dispensers of the salts.

A year after the launching of the campaign the proportion of diarrhoea cases being treated with Litrosol rose from zero to 50%. Moreover, 95% of women surveyed after a year knew about Litrosol and how to use it. *In the most heartening finding of all, the death rate from diarrhoea in children under two fell by 40% within a year and a half.*

nous feeding of solutions administered by qualified personnel in medical institutions which were beyond the physical or financial reach of most mothers. Now, the great majority of those 5 million dehydration deaths could be prevented by another breakthrough in the child health revolution – the use of oral rehydration therapy (ORT).

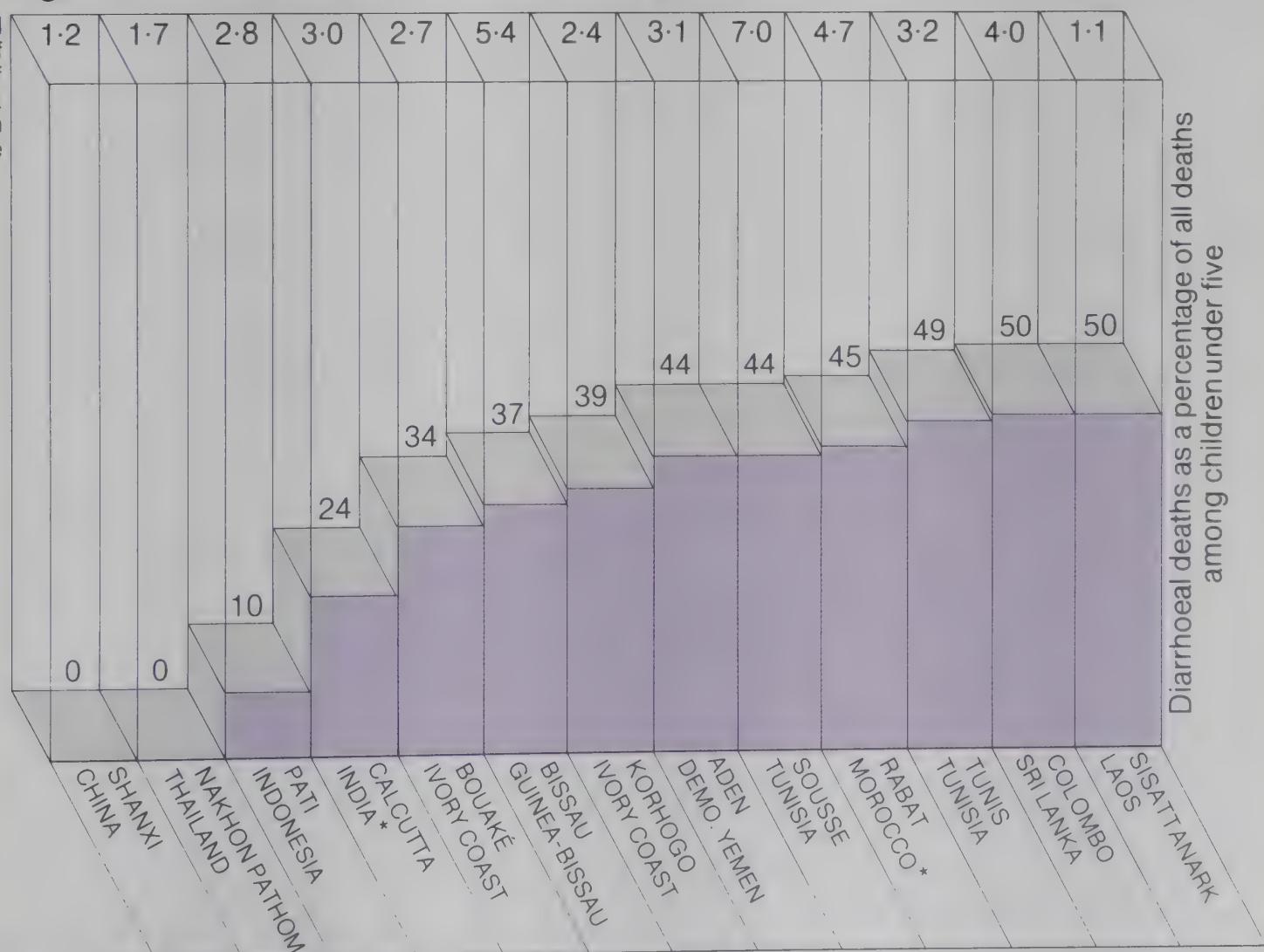
Attempts had often been made to rehydrate patients by mouth – usually by making them drink solutions of salt and water. But diarrhoeal infections not only increase the loss of fluids and salts from the body, they also inhibit the absorption of salts and water through the intestinal wall. Nonetheless it was the addition of sugar to such a

salt and water solution, in an attempt to make it more drinkable, which led to the accidental discovery of oral rehydration therapy. For it was shown that the absorption of sucrose was not affected by the infection. And the sucrose carries salt and water through with it.

So by using glucose as a Trojan Horse to smuggle salt and water through the intestinal wall, oral rehydration was suddenly made possible. Mixed in the right proportions, the sugar can increase the body's absorption of the salt and water by twenty-five times. And by administering enough of the solution to replace fluids lost to the body during diarrhoea, dehydration can be pre-

Fig. 1.11 Child deaths from diarrhoeal infections

Mean annual number of episodes of diarrhoea among children under five



Note: * 1981 figures, rest 1982.

Source: Programme for Diarrhoea Control: Third Programme Report, 1981-1982 WHO/CDD/83.8 Geneva

Bangladesh: healing at home

In Bangladesh, a quarter of a million children die each year from the dehydration and malnutrition linked to diarrhoeal infections. Most of them could be saved by simple oral therapy – if it were available.

The country's four factories for oral rehydration salts produce 2.5 million packets a year – as against an estimated need for 20 million. But even if production could be stepped up, three quarters of the population live beyond the reach of health services or drug stores and more than three quarters of all mothers would not be able to read the instructions on the backs of the packets.

To try to overcome these problems, 900 field-workers of the Bangladesh Rural Advancement Committee are now working in five of the country's twenty districts teaching 2.5 million women how to prepare a home-made version of oral rehydration salts using ingredients available in every household – salt and molasses. A three-finger pinch of salt (*lobon*) and a four-finger scoop of molasses (*gur*) dissolved in the right amount of water add up to an oral rehydration mixture which has been shown to be effective and is approved by the International Centre for Diarrhoeal Disease Research, Bangladesh, the world's leading institution for research into diarrhoeal disease.

Bringing this home-made solution to the villages remained the major hurdle. Travelling from their temporary quarters by foot, rickshaw and bicycle during the dry winter season, and by country boats during the monsoon, teams of oral rehydration workers go door to door in the villages, spending about 30–35 minutes with each mother and stressing the 'seven points' of successful treatment for childhood diarrhoea. Most important of all, mothers are taught that the attempt to 'dry up' the child by withholding food and drink – a natural

reaction of parents the world over – is a mistake which increases the risks of dehydration and child death. Finally, the worker watches the mother as she makes up the life-saving solution of *lobon-gur*.

One month after the oral rehydration teachers have left the area, a small monitoring team surveys 5% of the households visited to collect samples of the home-made oral rehydration solution and to ask mothers how many of the seven points they can remember. So far, the surveys have found that 98% of the women can prepare the home mix correctly and over 90% remember all or almost all of the seven points.

One possible reason for this success is that the oral rehydration teachers are paid by results – 16 cents for every woman who can remember all of the seven points, 8 cents for every woman who can remember 'nearly all', and only 4 cents for a woman who can only remember 'some'. If any woman cannot make up a mixture of oral rehydration salts correctly, the health worker who taught her receives nothing at all.

Even though the campaign is usually preceded by talks with the village men and the traditional healers and leaders of the community, many of the women who know how to make the oral rehydration mix do not use the technique when a child actually falls ill with diarrhoea. According to some surveys, usage rates vary between 8% and 60%. 'The difficulty lies in persuading village mothers to believe that such a simple thing can save a child from dehydration,' says Dr. Rahman, manager of the oral therapy campaign.

In October 1983, the campaign went into its second phase with the aim of covering half the nation by 1986.

vented or corrected in almost all cases. In the remote Teknaf region of Bangladesh, for example, a three-year study of over 30,000 cases of diarrhoeal infection has shown that 95% could be successfully treated by ORT.

Oral rehydration salts can be made up locally in health centres (see panel No. 1). Or with the right kind of community education programme, an almost equally effective mix can be made by mothers using ordinary domestic sugar and salt – supplying potassium in the form of bananas, plantains or papaya. Alternatively, the right proportions of salt and sugar, with small quantities of potassium and bicarbonate (to correct metabolic acidosis), can be made up and pre-packed in factories at a cost of less than 10 cents.

Whatever kind of oral rehydration method is used, the two vital messages for parents are:

- Continue feeding even when your child has diarrhoea and ...
- Begin replacing fluid losses by oral rehydration treatment as soon as the diarrhoea begins.

By this technology and these messages, most dehydration deaths can be prevented and growth can be maintained. Studies in the Philippines, for example, have shown that children treated with oral rehydration therapy during attacks of diarrhoea maintained monthly weight gain whereas children who did not have ORT available had lost weight as a result of diarrhoeal infections.

So much for the theory. Does ORT work in practice?

- In Guatemala, child deaths have been reduced by half among a population of 64,000 people in the eastern region of the country after 'health promoters' began teaching mothers how to use locally-made packets of oral rehydration salts (see panel No. 1).

- In Egypt, child deaths in the Nile village of Berket Ghatas have been reduced by 50% within a year of a community-backed oral rehydration campaign (see panel No. 7).

- In India, a population of 18,000 people in thirteen villages of the Punjab has seen its infant mortality rates from diarrhoeal infections halved by ORT in less than two years.

- In Costa Rica, child deaths from dehydration have dropped by more than 80% in hospitals since ORT was introduced and the hospital services have saved an estimated \$3 million in the first year (see panel No. 15).

- In Egypt, thousands of mothers have reduced the overall pre-school death rate from diarrhoeal diseases by 50% – using home-made salt and sugar solutions.

- In Bangladesh, community-based distribution of oral rehydration salts in the village of Shamlapur (population 7,000) resulted in 80% of diarrhoea cases being treated with ORT and a fall in the death rate to 0.5% of all cases as opposed to 2.4% in comparable villages.

- In India, death rates from diarrhoea in six villages fell to levels 80% lower than in nearby villages after health workers and community organisations began promoting locally-manufactured oral rehydration salts.

- In Honduras, the number of diarrhoea deaths among children under the age of two has been almost halved by the use of ORT. One year after the beginning of an education campaign – backed by intensive radio coverage – 95% of mothers knew how to make and administer the salts (see panel No. 13):

- In Trinidad and Tobago, child deaths from diarrhoeal infection dropped by 60% in the General Hospital, Port of Spain, in the five years after ORT replaced intravenous feeding as the main treatment for dehydration.

- In Haiti, the diarrhoea death rate among children brought into the State University Hospital, Port-au-Prince, fell from 40% to 1% after ORT was introduced in 1980. Because the mothers themselves were taught ORT, each child benefited from 'intensive care' and earlier rehydration.

- In Bangladesh, 900 field-workers have taught 2.5 million women how to make ORT solutions from the salt and molasses available in every household. Follow-up surveys have shown that more than 90% of the mothers can prepare an effective mix and a significant number are now using it (see panel No. 14).

- In Nicaragua, 80,000 young literacy workers

Costa Rica: deaths down 70%

During the 1950s Costa Rica had one of the highest population growth rates in the world. Infant mortality was running at around 90 per 1,000 live births and diarrhoea and dehydration accounted for 10% to 15% of all deaths.

Some progress was made during the 1960s and the infant mortality rate was reduced to just over 60 per 1,000 by the end of the decade. But the most dramatic change in the health of the nation began with the putting into action of a 10-year plan in 1970 – a plan directly aimed at improving child health.

Complete reorganisation of the Ministry of Health and of the Costa Rican social security system was followed by a programme to extend primary health care to the entire population.

Within four years the programme was screening 125,000 children and had enrolled 10,000 pregnant women in pre-natal clinics. Soon, evidence of its success was coming in in the shape of falling death rates. Over the whole ten years of the plan, measles deaths fell by 97%, tetanus deaths by 96%, and whooping cough deaths by 75%. Polio and diphtheria were eradicated.

Hygiene education, the promotion of breastfeeding, and the spread of safe water and sanitation had significantly reduced the incidence of diarrhoeal infection. But for the children who did contract a diarrhoeal disease, the risk of death from dehydration was still unacceptably high. In the 1970s, oral rehydration therapy was introduced into Costa Rica's hospitals, backed by intravenous feeding for the most serious cases. Within a year, deaths from dehydration at the National Children's Hospital fell from 18 to two.

For most rural families, hospital treatment for

dehydration was not available. So after trials in outpatient clinics, oral rehydration was taken out into the community in a campaign to teach parents to buy and use the sachets of oral rehydration salts in their own homes.

Again the results were dramatic. By 1980, there had been a 98% drop in the number of infants dying from diarrhoea and dehydration. Significantly, this major stride forward in child health also resulted in a huge financial saving. During 1977, the cost of consultations and hospital care for diarrhoea cases was estimated at \$3.5 million. The cost of the whole oral rehydration programme for Costa Rica's 250,000 pre-school children was \$232,000.

Costa Rica's comprehensive attack on its health problems was completed by the bringing in of the programme of social development and family assistance in 1975. Among the principal objectives was the construction of aqueducts and sewers to complement the provision of piped water which had been supplied to 98% of urban homes and 62% of rural homes by 1980. The accompanying programme of health and hygiene education continues to be promoted by television, radio, posters and the press – stressing the role of hygiene and hand-washing in preventing disease.

By the end of the ten-year plan, overall infant mortality in Costa Rica had been reduced by 70%. In the same period, the birth rate had dropped by 6%, with more widely practised child spacing also acting as a boost to maternal health and reducing the number of premature and low birth-weight babies. At the same time, illiteracy had been brought down to only 8% and life expectancy had been increased to over 70 years, putting Costa Rica on a par with a number of European countries.

have carried the ORT message into thousands of households and 334 ORT units have been set up across the nation. From being the leading cause of child death in 1980, diarrhoeal infection had dropped to fifth place by 1982 (see panel No. 13).

○ In Jordan, 1,720 out of 1,732 cases of diarrhoea were successfully treated by ORT in the General Hospital of Amman.

○ In one area of Turkey, the number of cases of diarrhoeal infection which had to be referred to fully qualified doctors has fallen from 34% to 4% since Assistant Nurse Midwives began taking oral rehydration salts into village homes and teaching their use.

Such examples demonstrate the potential of

Fig. 1.12 Developing countries producing oral rehydration salts

| REGION | COUNTRY |
|-----------------------|---|
| AFRICA | ETHIOPIA LESOTHO MOROCCO MOZAMBIQUE ZAMBIA |
| AMERICAS | ARGENTINA BRAZIL COLOMBIA COSTA RICA DOMINICAN REPUBLIC ECUADOR EL SALVADOR GUATEMALA HAITI HONDURAS PARAGUAY PERU |
| EASTERN MEDITERRANEAN | AFGHANISTAN EGYPT PAKISTAN SYRIAN ARAB REPUBLIC TUNISIA |
| SOUTH-EAST ASIA | BANGLADESH INDIA INDONESIA NEPAL SRI LANKA THAILAND |
| WESTERN PACIFIC | CHINA DEMOCRATIC KAMPUCHEA MALAYSIA PHILIPPINES REPUBLIC OF KOREA VIETNAM |

Source: Programme for Diarrhoea Control: Third Programme Report, 1981-1982
WHO/CDD/83.8 Geneva.

ORT. Both in preventing infant deaths and in preventing frequent setbacks to normal healthy growth, the technique could play a major part in a child health revolution. And there are now signs that things are starting to move. Countries as diverse as Nicaragua, Haiti and Honduras have now launched ORT campaigns designed to put this breakthrough at the disposal of every family. In total, over 30 nations are now beginning ORT programmes and at least 20 are gearing up for large-scale factory production of oral rehydration salts (see Figure 1.12). UNICEF itself is producing over 20 million sachets a year for 87 nations and, together with the World Health Organization, we are assisting more than 20 countries to begin local manufacture. Brazil alone is preparing to produce 20 million sachets a year and Pakistan has stepped up its distribution of salts from one million sachets in 1982 to five million in 1983. In total, present annual production of oral rehydration salts is running at around 80 million sachets a year as against the billion or more which would be needed if the sachets were to be made available to all children at risk.

But shortage of the salts themselves need not prevent the rapid spread of ORT. For if parents have the knowledge and the confidence to mix sugar and salt and water in the right proportions, then an almost equally effective oral rehydration solution can be administered in the child's own home. Although not quite as good as the pre-packaged salts made according to the UNICEF and WHO recommended formula, this slight disadvantage is more than made up for if home preparation means that oral rehydration therapy can begin earlier. If the parents also know that they should keep on feeding the child throughout the illness and that the solution should be used to replace body losses as soon as the diarrhoea begins, then most of those 5 million child deaths per year could be prevented.

In all of this, the central challenge will remain the creation of support for ORT among the health professionals, understanding within the community and confidence among mothers (see panel No. 7). Several times, ORT campaigns have foundered because mothers who knew how to make an effective oral rehydration mixture did not have the confidence to use it when the time

Lesotho: doubling immunization

The small land-locked Kingdom of Lesotho, set on the highest part of the great plateau of southern Africa, is not an ideal setting for any immunization campaign. More than half of the population lives in almost inaccessible mountain villages and fewer than half of the mothers can read.

But after a polio epidemic in 1976, the government decided on a major push to build vaccination programmes into the country's maternal and child health services. Final plans were drawn up by 1978 and in 1980 health centres all over Lesotho began holding special clinics for vaccinations – followed up by health education and nutrition guidance for the mothers who had brought their children along.

To keep the campaign going, 12 teams of vaccinators travelled by Landrover and motorcycle from health clinic to health clinic, village to village, immunising children and checking the 'cold chain' which keeps the vaccines at the right temperature.

Among Basotho children, 115 out of every 1,000 die before the age of one and another 20–25 will not live beyond the age of five. The cause of death is often an infectious disease – made both more likely and more severe by malnutrition. With one of the worst soil-erosion problems in the world, barely 15% of Lesotho's surface is fit to grow crops. Unable to make a living from the land, more than half of the men have gone to work in the gold mines and collieries of South Africa, leaving their wives behind to fend as best they can for themselves and their children. Immunization – which also helps to prevent malnutrition and gives a child longer to recover between the different setbacks to growth – is one way to

begin breaking the chains which constrain so many young lives.

Two years after the immunization programme began, at least two out of every five children between their first and second birthdays had been fully immunized against six of the most important killer diseases of childhood – measles, whooping cough, tetanus, diphtheria, tuberculosis and poliomyelitis.

Before the programme started in 1980, only one child in 20 was immunized against polio. In 1982, more than half of Lesotho's children had been given the full three doses of anti-polio vaccine. At the same time, the proportion of children vaccinated against diphtheria, whooping cough and tetanus also increased, from 37% to 56%. Against tuberculosis, protection doubled from 40% to 81% of all children.

In 1976, not a single child in Lesotho was immunized against the biggest child killer of all the immunizable diseases – measles. Today, half of the country's one-to-two-year-olds are protected.

The credit for the success of the immunization programme goes both to the maternal and child health staffs and vaccination teams, and to the thousands of Basotho women who, despite their 16-hour working days, absent menfolk, and heavy responsibilities, carried their children many miles for the protection of immunization. With the mothers' enthusiasm keeping up the pressure, the immunization campaign in Lesotho may yet achieve its aim of full protection for every child within the next three years.

came (see panel No. 6). But once created, a parent's confidence in his or her own ability to bring about improvements in family health will probably not stop at ORT.

The campaign to promote the knowledge and use of oral rehydration therapy was given a major boost in June of 1983 when experts and practitioners from all over the world convened at the International Conference on ORT in Washington D.C. to share recent experiences and plan future strategies. The Conference (sponsored by US AID, WHO, UNICEF, and the International Centre for Diarrhoeal Disease Research, Bangladesh) reached a consensus on all the fundamental points—that diarrhoea is a major killer and debilitator of children; that ORT is a safe, affordable and effective therapy; that the right basic chemical composition of the salts is generally agreed upon; and that the challenge now is how to put the new technology at the disposal of all who need it. *'Much progress has been made'*, said Dr. Lincoln Chen in his summing up of the Conference's proceedings, *'much more needs to be done, and done soon. Oral rehydration therapy is increasingly capturing the imagination of the policy makers, the scientists, and the public.'*

Meanwhile, further advances in the therapy itself are still being made. In the last two years, the International Centre for Diarrhoeal Disease Research in Bangladesh (a pioneering institute which has been given substantial support by the United States Agency for International Development and by the United Nations Development Programme) has run successful field-trials with an oral rehydration solution based on ground-rice boiled into a thin soup with only a three-finger 'pinch' of salt added. Other cereals—all of which contain the necessary glucose—could be used in the same way. Even cheaper and more available than sucrose or sugar-based solutions, these cereal-based salts have even less risk of side effects and can shorten the duration of diarrhoeal infection. And even without the chicken or vegetables which can be added, they can help in the vital task of maintaining nutrition and protecting growth even through bouts of diarrhoeal infection.

Research is now needed to prove the viability of the cereal-based salts and to find and test the combinations of locally available ingredients from

which effective oral rehydration solutions can be made. But the more difficult challenge is to put what is already known at the disposal of millions of families who need it. And just as glucose and salt are the two vital ingredients of the 'technological breakthrough', so support of the national community through all available means of communication and the rise of new kinds of local community development workers are the two vital ingredients in the 'social breakthrough' which is as necessary as the salts themselves if ORT is to play its part in a child health revolution. (See panel No. 7).

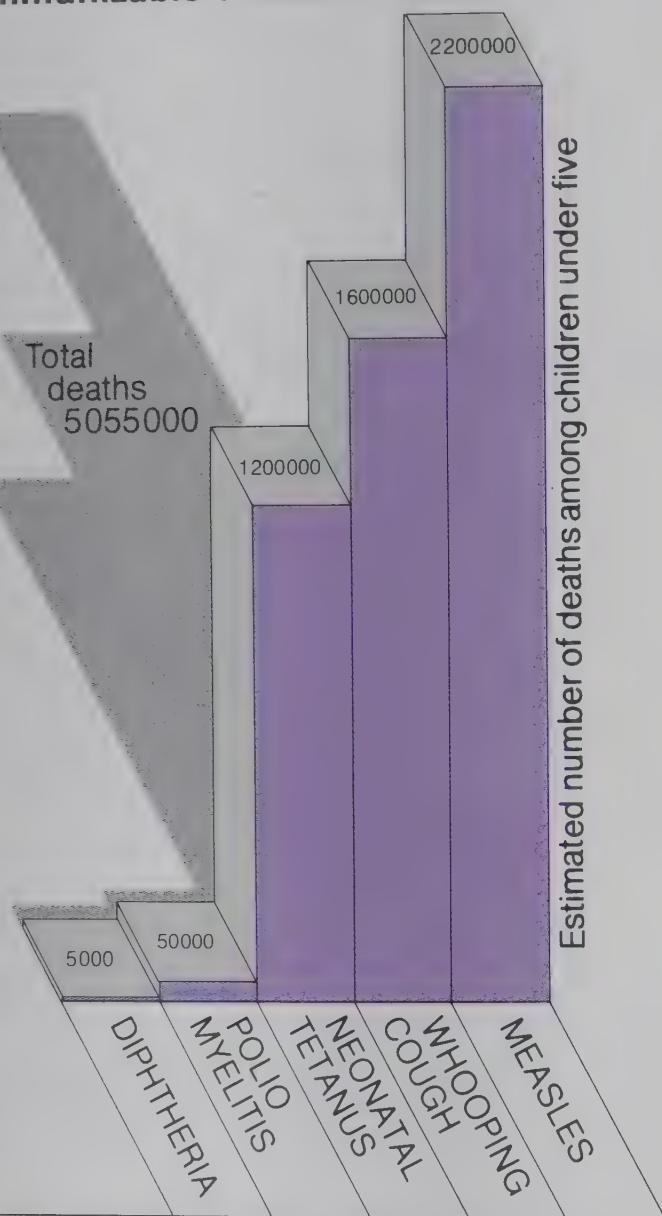
Expanded Immunization

Every six seconds, a child dies and another is disabled from a disease which can be immunized against (See Figure 1.13). Many more suffer setbacks to normal health and growth.

Immunization against the six major communicable diseases of childhood—measles, tetanus, whooping cough, diphtheria, poliomyelitis and tuberculosis—costs approximately \$5 per child. Most of the \$5 is for the delivery system—the vaccines themselves cost only 50 cents. To immunize every one of the 100 million children born each year in the developing world would therefore cost approximately \$500 million a year. To compare the cost of such benefits with the cost of weapons of war has become a cliché of development literature. Yet it may perhaps bear pointing out that this sum of \$500 million needed to prevent the deaths of five million children a year and the disability and malnutrition of many millions more is equivalent to the cost of only ten of today's most advanced fighter planes.

The case for a campaign to immunize every child does not need to be clothed in argument. The barest facts will do. But the role of immunization as a weapon in the child health revolution is even greater than the saving of the lives of 5 million children a year and the preventing of disability in the lives of 5 million more. All of the immunizable diseases—but especially measles and whooping cough—are also driving forces in that cycle of malnutrition and infection which sets back the growth of millions of those who survive the infections themselves.

Fig. 1.13 Total child deaths from immunizable diseases 1980



Note: No reliable estimates available for tuberculosis

Source: Based on WHO estimates.

Measles, for example, was found in one African study to be the 'precipitating cause' in half the cases of hospitalisation for malnutrition. And as the growth-chart on page 24 shows, there is also a synergistic reaction between the different infections themselves. In the case of this particular child, it was measles and diarrhoea which set back the child so severely that there was no resistance left when whooping cough struck only a few weeks later. The formal death certificate simply said 'whooping cough'.

All infections are nutritional setbacks. Often, the climb back to normal weight and growth takes several weeks. Immunization against the six main infectious diseases of childhood would therefore be a partial 'immunization' against malnutrition itself. And it is because it strikes against infection *and* malnutrition that immunization is one of the sharpest tools for cutting into the vicious cycle and reducing the severity and frequency of setbacks to the normal development of the child in its most formative years.

Given the fact that immunization can play such a vital part in protecting healthy growth, and given the fact that the necessary vaccines have long been available at a very low cost, why is it that no more than 10% to 20% of the world's young children are now immunized? (See Figure 1.14).

At first sight, immunization would appear to be a relatively easy or 'clean' intervention: the process itself is quite simple; it produces dramatic results; it has the appeal of modernity without requiring any deep-seated changes in attitude or behaviour. Yet a second look reveals some less simple elements: only certain vaccines can be combined into the same 'shot'; immunity may require three separate visits; BCG (tuberculosis) injections should ideally be given at birth; anti-tetanus vaccine should be given to the mother in pregnancy; other injections should begin as soon as possible after the second month – except measles which should wait until the ninth month; and all of this has to be permuted into a plan to immunize 100 million children a year – every year – with vaccines which must be kept refrigerated from the day they are made almost to the day they are used.

Add to this poor transport and communications; illiteracy and scattered populations; the absence of electricity and the shortage of fuel; the scarcity of skilled manpower and the limited outreach of health services – and it becomes obvious that immunization is not as simple as it looks.

To compound the problem, probably a majority of uneducated parents are reluctant to bring their children three or four times for inoculations which may cause temporary fevers and restless nights. Until a recent intensive media campaign,

many of the immunization units in Karachi, for example, were vaccinating only about ten children a day. In many countries, only a minority of all the children born are brought for the first injection, only half of those turn up for the second, and only half of those come for the third – thereby missing out not only on complete DPT protection (against diphtheria, pertussis and tetanus) but also on the vital measles injection which is often administered during that third visit. The education and involvement of parents is therefore a greater challenge than the technology of vaccines or the financing of immunization campaigns.

In the face of all these difficulties, but with the momentum of the successful eradication of smallpox behind it, the World Health Organization launched its Expanded Programme of Immunization (EPI) in 1977 with the aim of assisting all nations to immunize all children against all six diseases by 1990.*

At about the half-way point, there are many impressive achievements. More than 130 places in the developing world have so far launched their own expanded programmes of immunization. World-wide more than 1,000 senior national and international EPI staff and 10,000 middle-level

*UNICEF itself works closely with WHO in this programme and is the world's largest supplier of vaccines and 'cold chain' equipment.

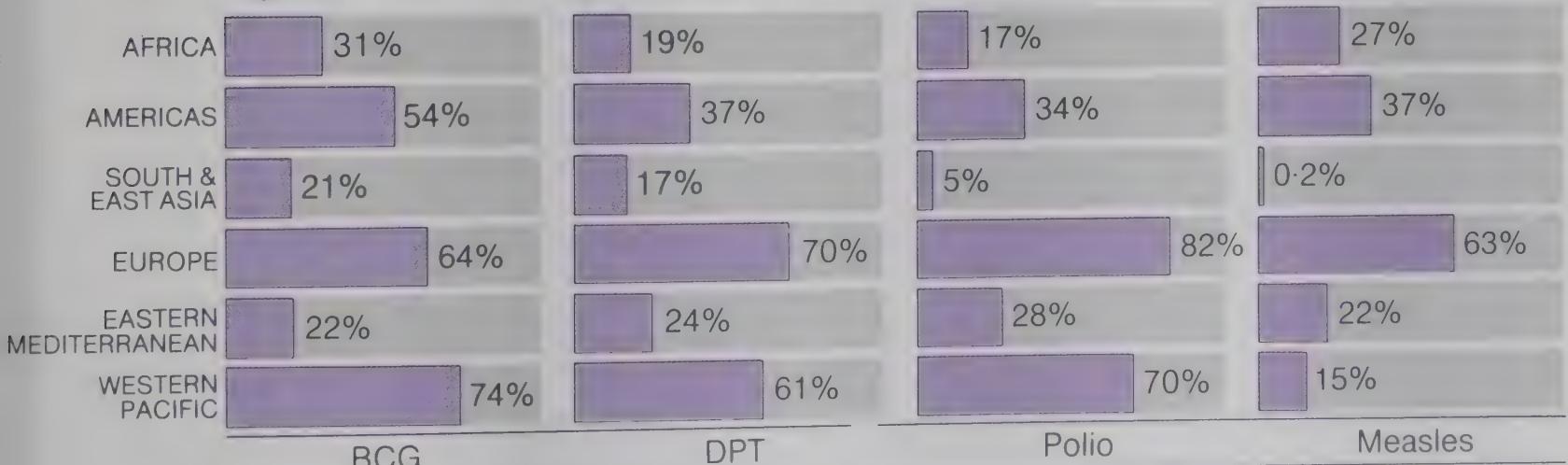
managers have been trained. Many countries – including Brazil, the Congo, Gambia, India, Kenya, Lesotho, Malawi, Mozambique, Oman, Sierra Leone, Sri Lanka, Tanzania and Thailand – have made significant progress.

But overall, less than 20% of the children born this year into the developing world will be protected by immunization. And the target of immunizing all children by 1990 is not now going to be even nearly met unless there is a sudden surge of acceleration towards it.

Technological breakthroughs are becoming available to make that re-acceleration easier. New vaccines can retain their potency for longer periods and at higher temperatures. Solar-powered refrigerators, colour-change temperature warnings, and low-cost sterilisation techniques are all now undergoing trials. But the great barriers to be overcome are no longer technological. The problems which stand in the way of immunizing all children are the problems of parental education and community involvement, money and management, organisation and training.

To solve such problems, immunization campaigns usually need to be integrated into other primary health care and community development networks which can provide *continuity of contact* between people and immunization services.

Fig. 1.14 Percentage of children immunized in the first year of life



Note: DPT = Diphtheria, Pertussis (Whooping cough) and Tetanus

Source: WHO Expanded Programme on Immunization. Global Advisory Committee Meeting, October 1982

Malawi: measles down 60%

The people of Malawi suffer from poor health even by the standards of their neighbours in south-east Africa. The leading cause of sickness among children is malaria, followed by respiratory and diarrhoeal diseases. The main cause of child deaths, however, is measles (over 18 per cent of all inpatient deaths in 1979), trailed by pneumonia, malaria and nutritional deficiencies. Besides being especially vulnerable to all these illnesses, young children also have whooping cough to contend with. Chronic malnutrition adds to their burden and reduces their chances of survival, especially during January and February when food stocks run low and the rains may bring on yet more diarrhoeal diseases.

Protection against infectious diseases is accordingly a high priority in Malawi's maternal and child health care programme, set up in 1975. Immunizations are part of the routine duties of the clinic nurses and mobile teams which serve most of the country. In addition, special mini-campaigns are conducted against measles wherever the disease breaks out.

The childhood immunization programme was evaluated in early 1983 and found to have registered remarkably good results. Just over half of the children in the sample had been fully immunized against the principal infectious diseases of childhood. More precisely, 60% had been fully vaccinated against diphtheria, pertussis (whooping cough) and tetanus, and 72 per cent had been fully immunized against polio. Eighty-six per cent of the children had been protected against tuberculosis and 60% had received measles shots.

Even though the coverage is not yet complete, immunization has made its mark on the incidence of disease in Malawi. The number of outpatient

referrals for whooping cough, for example, went down from 27,595 in 1978 to 18,627 in 1981, and referrals for measles fell from 246,511 in 1978 to 84,610 in 1981.

These figures have been achieved in the face of considerable obstacles. Recent shortages of fuel and transport, for instance, have meant that the mobile teams could hold mother-and-child clinics only once a month, or sometimes not at all, instead of twice a month as planned. For the same reasons, vaccines and supplies have not always been available either of late. The evaluators found, for example, that around a third of the health units they visited had no polio vaccine and a fifth had no tuberculosis vaccine. Some units also needed thermometers, and kerosene and spare parts for refrigerators.

Since the success of an immunization programme depends on its being accepted by the public, the campaign also monitored parental awareness of the need for immunization. They found that 80% of young mothers with children under three, selected at random, could define immunization and its purpose. They also knew which were the target illnesses and were able to give details of most of them: 89% could describe the symptoms of measles, 81% whooping cough, 75% polio, and 62% tuberculosis. Nine out of ten mothers understood which immunizations their children had received, and all of them knew that they had to return for more.

The credit for their being so well informed must go largely to the staff of Malawi's mother and child health care programme. A quarter of the mothers had obtained their information from friends, husbands and parents, but fully two thirds of them had received their education in immunization from health staff, mostly at ante-natal clinics.

Unlike smallpox, which could be eradicated because humans were its only carriers, diseases like tetanus, whose spores are carried in the earth itself, cannot be eradicated. The challenge of immunization programmes is therefore not the challenge only of the one-off mass campaign but the double challenge of building a permanent system capable of delivering vaccines to every infant every year and of educating every new generation of parents about the need to bring their infants for the full course of injections.

To meet that challenge will mean mounting much more intensive and extensive campaigns to involve and inform communities and families about the demands which they must make of immunization services and the demands which immunization services must make of them. The chances of all children being present at the right times and the right places three times a year every year are considerably enhanced in communities which understand the reasons for this schedule and are involved in planning the how and the where and the when. So even for the 'clean intervention' of immunization, social and organisational breakthroughs – and community education – are as important as technological progress if immunization is to play its potentially decisive role in a child health revolution.

Money is important. The present annual investment of \$72 million needs to be more than quadrupled over the next six years if the 1990 target for universal immunization is to be met. At the moment, 80% of the money is coming from the developing countries themselves.

But more important still is the mass mobilisation and the involvement of every possible means of communication in order to bring all parents to the point where they demand immunization for their children and understand that they must complete the full course of injections.

Synergisms

The four strategies discussed so far – growth monitoring, the promotion of breastfeeding, oral rehydration therapy, and expanded immunization – are strategies which are in a class of their

own at the present time. They are low-cost. They are available now. They are almost universally relevant. And they achieve rapid results.

More than that, such actions carry the flag for primary health care itself. They reverse the usual relationship between doctor and patient by using knowledge and technology to empower rather than alienate those whom they are designed to serve. Rather than making people passive and dependent recipients of health care, they enable people to become informed activists in the protection of their own and their families' well-being. And in so doing, they promote the cause of self-reliance and people's participation in health.

Most important of all, these four simple actions are aimed at the heart of the world's major child health problem – the synergistic alliance of malnutrition and infection which now attacks hundreds of millions of our young children during the most vital years of mental and physical growth.

So far, the four strategies have been discussed individually. But just as malnutrition and infection join in a synergistic alliance to attack the health and growth of young children, so the different strategies ranged against them can also act in concert to defeat that alliance. A breastfed child or an immunized child is less likely to contract diarrhoeal infections; a child with fewer episodes of diarrhoea is less likely to be malnourished; a child who is less malnourished is less likely to contract infections. And every infection and weight loss prevented – whether it be prevented by immunization or breastfeeding or ORT or by careful monitoring of growth – makes another break in the cycle, puts more space in between setbacks, allows more time for recovery, and makes subsequent infection or weight loss a little less likely. In short, the combined impact of these four principal strategies can be considerably greater than the sum of their individual contributions.

The combined potential of these breakthroughs for child survival and growth is today very similar to the potential which high-yielding varieties (HYVs) of wheat and rice held for world food supplies in the late 1950s and early 1960s. At that time, doubling and even trebling the yields of first wheat and then rice became scientifically possible.

China: overcoming the odds

Over the past 34 years, the People's Republic of China has demonstrated on a massive scale that great strides forward in health need not wait upon advanced levels of economic development. With an estimated GNP of only \$300 per person per year, China is still among the world's poorest nations. Yet its infant mortality rate is among the very lowest in the developing world. More than on technology or money, that achievement has depended on political commitment and social organisation.

By contrast, the *Beijing Review* reported in 1981 that such scourges as plague and typhus had been virtually wiped out. The incidence of malaria and schistosomiasis had been sharply reduced, and cases of polio had fallen to just over one per 100,000 population. Tuberculosis, the leading cause of death in pre-liberation China, killed an estimated 200 people per 100,000 population a year; in 1975, largely as a result of immunizations, it carried a mortality rate of 43 per 100,000 and had moved to ninth place as a cause of death.

In Tianjin, the country's third largest city, the reduction of childhood diseases between 1950 and 1978 ranged from 75% for measles to nearly 100% for diphtheria.

China has waged its battle against these diseases almost entirely without the technology normally considered a prerequisite to immunisation.

A particular problem has been the lack of electricity or equipment to keep polio and measles vaccines at the necessary low temperatures. As recently as September 1982, a WHO mission noted that none of the health facilities it visited in Hubei province had refrigerators. But solutions have generally been found, whether it has meant

transporting children *en masse* to the nearest health centre with a refrigerator or taking advantage of China's freezing winters to run polio campaigns.

Immunization has been only a part, albeit an integral one, of China's health policy since 1950. Despite some shifts in approach, this policy has never wavered from the principle that preventive care should take precedence over curative services – a traditional tenet of Chinese medicine.

In the 1950s and early 1960s this principle took shape primarily in massive campaigns against such major health problems as schistosomiasis, malaria, venereal diseases and the 'four pests' (flies, mosquitoes, rats and bedbugs). Epidemic prevention centres were set up to mount equally energetic immunization drives.

The years after 1965 brought a new emphasis on decentralisation and on the provision of health care in the countryside, home of some 850 million of China's billion inhabitants. The main responsibility for immunizations shifted to the barefoot doctors, the paramedics who are probably the best-known feature of China's health system. Working in the production brigades or in the factories and neighbourhood health stations of the cities, the barefoot doctors have ensured that most of the country's population receives at least the basic elements of health care.

China's achievements in infectious disease control should not be considered in isolation: policies of full employment, a guaranteed food supply and a high level of literacy have all played a vital part. But its immunization record does suggest that technological shortcomings need not be a major stumbling-block, provided that a country is wholeheartedly committed to protecting its children from disease.

But the power of the discovery was only a *potential power* because the HYVs needed the widespread availability of fertiliser, pesticides, controlled irrigation, and thousands of agricultural extension workers to train farmers in the management of the new seeds. In the late 1950s, hardly any of these essential ingredients of the Green Revolution existed on any significant scale in the low-income countries. As with the possibility of a children's revolution today, breakthroughs in organisation were needed to liberate the potential of breakthroughs in knowledge and technique.

By the mid-1960s, an explosion of training, tube-well drilling, and fertiliser use, especially in Asia, had begun to liberate this potential. Suddenly, the new seeds were doubling and trebling yields not in the demonstration zones of scientists but in the fields of farmers.

The organisational process by which the technological breakthrough of HYVs was translated into huge harvests holds many lessons for the present task of translating the potential of such breakthroughs as oral rehydration therapy into improvements in the health and well-being of children. First of all, it was noticeable that in every case where the potential of HYVs was fulfilled on a significant scale and in a short period of time, the mainspring of the achievement was the commitment of national governments at the highest levels. In India, Pakistan, the Philippines, and Turkey, for example, Heads of State or senior ministers personally took charge of the task. Principally because of this commitment, it became possible to mobilise the other ministries and government departments whose involvement was needed to make the Green Revolution happen. And it is this mobilisation at different levels and across different sectors of a nation's life which is the second important lesson to be learned from the experience of liberating the technological breakthrough of high-yielding seeds. For the management of this achievement was not the exclusive preserve of the Ministry of Agriculture. Ministries of Finance were involved in arranging the foreign exchange to buy vast quantities of fertilisers and pesticides; Ministries of Transport were involved in the problems of conveying both

inputs and the doubled and trebled outputs which were the result; Ministries of Commerce were involved in arranging credit for thousands of farmers to invest in the process. Ministries of Information helped to spread the word about the revolutionary potential of HYVs. And important as they were to the Green Revolution, Ministries of Agriculture could not have achieved all this alone – any more than Ministries of Health alone can bring about a child health revolution today.

Finally, the Green Revolution offers the moral of mass mobilisation. Millions of farmers had to be reached, informed, given credit, persuaded, and backed up by technical expertise. Mass-media interest played a big part in communicating the potential of the breakthrough and farmers' associations of all kinds were deeply involved. At the same time, thousands of agricultural extension workers were recruited and trained for the task of communicating to farmers precisely how the new seeds were to be managed.

Political commitment at the highest levels of government; the involvement of all relevant ministries; the bringing together of a complex but mutually reinforcing 'package' of training, financing, education and transport and an equivalent technological 'package' of seeds, fertiliser, pesticides and irrigation; and the mobilisation of every available means of linking the breakthrough in knowledge to those whose lives could be improved by it – these are the lessons which the experience of the Green Revolution offers to the present potential for an even more important revolution in the survival and healthy growth of children.

After reading of the potential of child growth-monitoring charts in last year's *State of the World's Children* report, for example, the Chief Minister of Kashmir contacted UNICEF's Regional Office in New Delhi to ask for assistance in procuring one million growth charts. Discussions followed about how to bring a 'package' together to bring out the potential of the chart: how to provide scales calibrated in the same way as the charts; how to advise mothers on breastfeeding and weaning; how to provide supplementary food for the poorest households; how to introduce oral rehydration therapy and immunization cam-

Colombia: small is saveable

The normal weight for a baby at birth is about 3 kilos. Anything below 2.5 kilos is considered 'low birth-weight' and the lower the weight the greater the risk to the infant's health and life. Of babies born below 1 kilo, for example, nine out of every ten will die in their first month. Even at 2 kilos, the risk to life is approximately ten times greater than for babies of normal weight at birth.

World-wide, more than 20 million low-birth-weight babies are born each year and almost a third of them die before reaching the age of one. The incubators and intensive care which are often needed to save them are only found in modern hospitals and are therefore not available to the vast majority of low-birth-weight babies who are born to very poor mothers.

Now, a revolutionary technique pioneered by San Juan de Dios Hospital, in Bogota, offers life-saving 'intensive care' to all low-birth-weight babies who need it whether they are born in a hospital or not. The new technique needs no technology. Its cost is zero. And it is based on breastfeeding.

Under the leadership of Dr. Edgar Rey, a team of Colombian paediatricians have begun introducing new procedures for low-birth-weight babies in the hospital's Mother and Child Institute. Instead of being placed in incubators, low-birth-weight babies are 'packed' close to their mothers – under the blouse or sweater right next to the breast. There the baby's temperature (a major problem with very low-birth-weight babies) is regulated by the mother's own body. And instead of bottle-

feeding in a separate nursery – or being taken out of the incubator and breastfed only every few hours (another problem with low-birth-weight babies is that they often can't suckle for very long at a time) – the 'packed' baby can feed in small amounts as often as it likes.

The baby thus gains all the advantages that breastfeeding can provide – the best nutrition, immunity from infection, freedom from both diarrhoea and constipation, and the affection fostered by the closeness between mother and child. If the mother doesn't have enough milk, the baby is given guava juice with sugar and water – never a commercial milk substitute.

The Colombian team then took an even more unconventional step. As long as the baby is healthy, mother and child are sent home from the hospital as soon as possible – regardless of the baby's weight.

Overall, the results have been dramatic. Before the new techniques were introduced, all babies weighing less than 1 kilo died. Now, three quarters of them are being saved. And for those weighing between 1 and 1.5 kilos at birth, the death rate has dropped from 70% to only 10%.

At the moment, what has been learnt at San Juan de Dios Hospital is of benefit to only a small number of mothers. But because it is based not on expensive technology but on empowering mothers to save lives, it is a breakthrough with the potential to reach out and save children's lives in the poor communities of Bogota, and beyond.

paigns; how to work towards other basic services; and how to go about collecting data for nutritional surveillance and early warning.

Without the 'package' of organisational and technological synergisms, the full potential of

these breakthroughs in knowledge and technique would not be realised. Without the commitment of a political leader who could mobilise different departments of government, the 'package' would not be possible.

The Mother of Change

If progress for children is to be accelerated despite difficult economic times, then the campaign for more resources for development has to be combined with a search for ways to improve the ratio between resources and results. Four such ways have already been discussed. But recent research in the developing world is also highlighting three more sets of changes which, though deeper-seated – and therefore more difficult and more costly – are of such potential significance for the health and well-being of the world's children that they must also now be counted among the breakthroughs in knowledge which make possible a child health revolution. Indeed so powerful are these levers for increasing child well-being that their effective incorporation into national child survival strategies could reduce child deaths and child disabilities by two-thirds within ten or fifteen years.

All three of these changes – in quite different ways – imply the further empowering of women.

Food supplements

One of the least-known but most important facts about infant deaths in the developing world is that the 10% – 15% of babies who are born with low birth-weights (below 2,500 grams) account for between 30% and 40% of all deaths in the first year of life. In other words, low-birth-weight babies are approximately three times more likely to die in infancy (see Figure 1.16). Among those who survive, low birth-weight has also been

shown to be associated with longer and more frequent illnesses and with mental and physical impairments.

Reducing the incidence of low birth-weights, if it could be done, would therefore be a breakthrough of enormous significance for child survival and child health.

In the industrialised world, low-birth-weight babies are usually premature babies. In the developing world, low-birth-weight babies are usually 'full-term' babies; the reason their birth-weight is low is that they have been malnourished in the womb. And one of the main reasons for that is that the mother herself has been malnourished in her pregnancy.

On a subject of such obvious importance to the health of the world's children – and women – it is astonishing that there should be so little research. But the one major study of an attempt to prevent low birth-weights – by preventing malnutrition in the womb – has shown that it is possible and possible at a relatively low cost. In doing so, it has put another potentially powerful weapon at the disposal of a child health revolution.

The study, undertaken by the Institute of Nutrition of Central America and Panama (INCAP) in four villages in eastern Guatemala, showed that a food supplement of only a few hundred calories a day – given to women in the last three months of pregnancy – could reduce the incidence of low birth-weight from over 30% to only 4% or 5% and associated infant deaths by more than 50% (see Figure 1.15).

One other study, in India, has also shown that birth-weights can be significantly raised by an average of 300 grams through a daily supplement of 500 calories and 10 grams of protein for women in the last three months of pregnancy. A similar study, also in India, concluded that iron, folic acid, and food supplements for pregnant women were the single most cost-effective means of reducing peri-natal mortality among infants.

Even though we are now talking about extra food for the poorest mothers – rather than any general food subsidy – food supplements have a reputation for being both expensive and inefficient. Both accusations arise from the difficulties – and the costs – of actually targeting such supplements to those who are most in need. In one case in Colombia, for example, the provision of an 850 calorie-a-day food supplement to pregnant women only achieved an increase of about 130 calories a day in the actual intake of the women themselves. The reason was that much of the extra food went to other members of the family or was used in the place of food which would normally have been bought. But given the potential benefit of food supplements to the health of the mothers and children in greatest need, these problems cannot be regarded as insuperable. And once again it is the combination of scientific and social progress which now offers a way forward.

Scientific research has made its contribution to cost-effectiveness by making it possible to predict the low birth-weight risk even quite early in pregnancy. Women who weigh less than 90% of a woman's normal weight-for-height at the onset of pregnancy, or who have an upper arm circumference of less than 23.5 cm, or who fail to gain 1.5 kg. a month in the last 3 months, or who are over 35 years old, or who have had 4 or more pregnancies, or who have previously given birth to low-birth-weight babies, or who are anaemic, or who have placental malaria – would all be candidates for food supplements both to improve the health of the mother and to reduce the risk of low-birth-weight babies.

Social progress – in the increasing number of community development organisations, primary health care services, paraprofessional development workers, rising literacy and new communica-

cation channels – can translate that theoretical knowledge into practical benefits. A community development worker with a simple arm-circumference measuring band, for example, can identify women most at-risk. If the community itself is also involved and informed, then the special needs of the most vulnerable groups are more likely to be understood and the supplementary food made available for them is more likely to be consumed by them.

For the poorest mothers, that food supplement in pregnancy not only reduces the risk of low birth-weight but also builds up the 'energy bank' which a woman needs to breastfeed her baby without depleting her own body. If that supplementary feeding for women at-risk can continue at about the same level (approximately 500–600 calories per day) after the birth itself, then the quality and quantity of breastmilk can be maintained for a longer period of time – so extending the vital protection which breastfeeding affords to child health and growth in those vital early months.*

Finally, food supplements may also be necessary at the time of weaning itself – the time when so many millions of children slip into that downward spiral of malnutrition and infection.

For perhaps one third or more of the children in poor communities of the developing world, the absolute shortage of food in the house is the main cause of malnutrition. For such children, normal growth is almost impossible. Breastfeeding may protect them for the first few months. Oral rehydration therapy may prevent them from losing weight or dying of dehydration. Immunization may save them from some infections. Growth charts may inform their mothers that something is wrong. Health workers may advise on what can be done. But without enough of the right kind of food when weaning begins, growth cannot be normal, resistance cannot be kept up, and impair-

*Maternal malnutrition does affect the duration, quantity and quality of breastmilk – in that order. But even for the babies of malnourished mothers, breastmilk is still better than any artificial substitute. In Sri Lanka, for example, a study of four-to-eight-month-old infants born to poorly nourished mothers showed that 76% of breastfed babies and only 29% of artificially fed babies gained 90% of normal weight-for-age.

ment of the child's development cannot be prevented.

For such families, extra food in the house is therefore an indispensable part of any strategy to protect the normal healthy growth of children.

The reason for the lack of food in the house is either the lack of money to buy food, or the lack of a large enough plot to grow food, or the lack of the means to make land produce food. And the solution to these problems will require, above all else, agricultural reforms, land tenure changes, more training and credit for small farmers, and increasing employment for poor people.

In the meantime, the malnutrition of so many children in the most formative years of their lives is itself one of the forces which undermines progress towards that ideal. For in its effect on the growth of individuals, and eventually on the capacity of communities, hunger perpetuates that cycle of low energy, low productivity, low income,

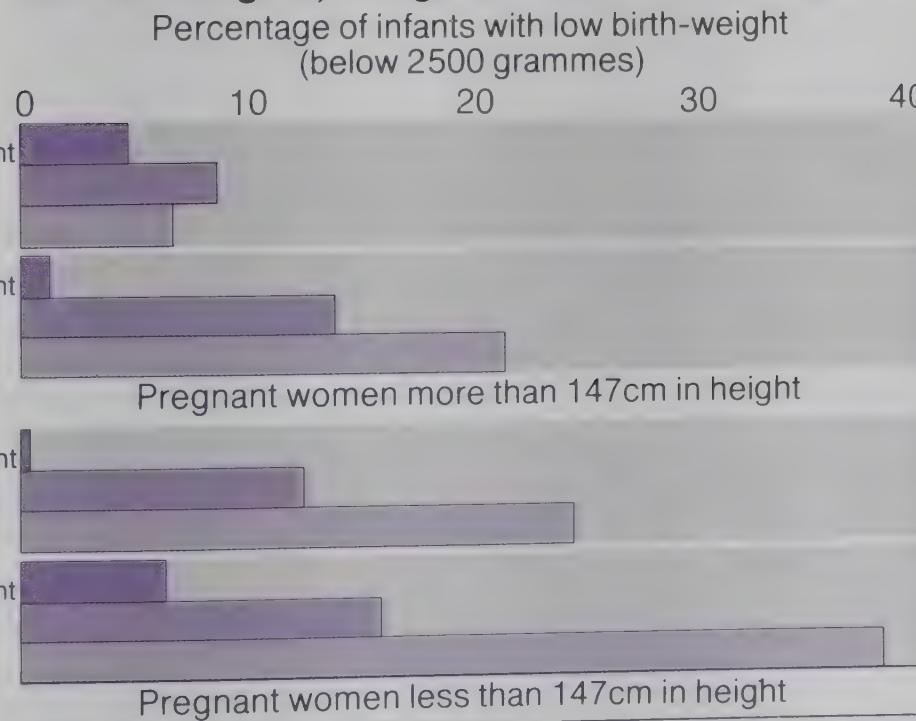
and low levels of investment in community development, which result in poor health and nutrition being perpetuated from generation to generation.

Somewhere, somehow, that cycle must also be broken. And whilst the pressure must be kept up for fundamental political and economic change, direct intervention to get more food to the families most in need is also a fundamental requirement.

To make such food supplements affordable and cost-effective, they will again have to be targeted to those mothers and children who are most in need. And again it is the spread of primary health care, the use of growth charts, and community involvement in health, which can make that targeting possible.

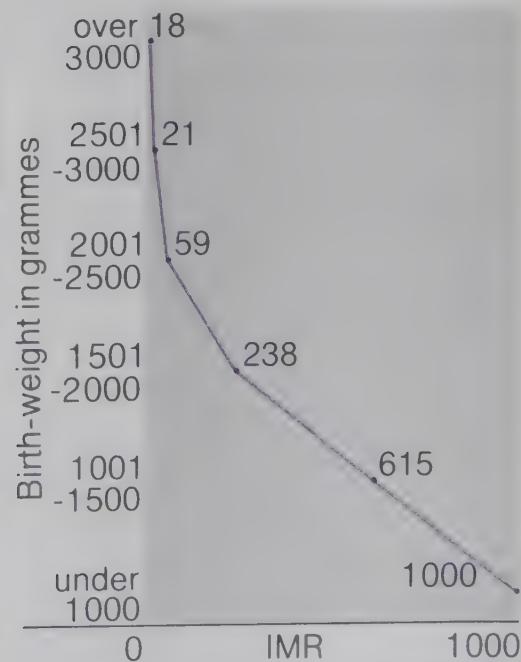
It is important for the community and the family to know, for example, that the growing body of a young child needs twice as much protein

Fig. 1.15 Effects of extra food in pregnancy on birth-weights, villages in Guatemala, 1979



Source: Daza and Lechtig, 1979.

Fig. 1.16 Infant mortality and low birth-weight



Note: Figures for New Delhi, India, 1969-1974
Source: Ghosh, et al., 1978



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Guatemala: fortifying sugar

At least 100,000 children lose their eyesight each year as a result of Vitamin A deficiency. The remedies – nutrition education, fortifying food with Vitamin A, or distributing Vitamin A capsules – are not always easy to organise. But they cost only a matter of a few cents and can often be dovetailed into other health care services. So in those parts of the world where children are being blinded by the lack of Vitamin A, these methods could also be powerful weapons in a child health revolution.

Vitamin A is found in milk, butter, egg yolk and liver – high-protein, high-priced foods well beyond the means of those most at risk. Cheaper sources are green-leaved vegetables, fruits and yellow vegetables such as carrots.

Usually, a store of Vitamin A is held in the liver. But long-term deficiency has irreversible consequences. Initially it affects the lungs, stomach, urinary tract and tongue. The final stage, known as keratomalacia, strikes suddenly, leading in a matter of hours to incurable total blindness and sometimes to death.

As with most deficiency diseases, young children are most at risk. They are protected while still in the womb, and breastfed babies receive an extra supply in their mother's milk; the most vulnerable age is between six months and five years.

The true figure for the numbers of children blinded by the deficiency may well be far higher

than 100,000 (the deficiency is usually not detected until too late, and since it affects mainly the poor, many cases never receive medical attention and so go unreported). It is commonest in the rice-eating areas of south-east Asia and India, but is also widespread in the Middle East, in parts of the Caribbean, in north-east Brazil and in Central America.

The Institute of Nutrition of Central America and Panama has long experience of the problem. Some 30 years ago their studies in Guatemala showed that 80% of the population was deficient in Vitamin A, with more than 30% at serious risk. The Institute tried to combat the deficiency by nutrition education, but with little success: the people most at risk could not even afford enough vegetables, let alone the meat or dairy products which would have helped them most.

Massive oral doses of the vitamin every six months were another option, but one that posed intractable problems. The solution came in 1968, when it became possible to fortify foods with Vitamin A. The Institute selected sugar as the 'carrier' for Guatemala because it was cheap and most people ate it regularly. Resistance had to be overcome, but by 1975 all the nation's sugar was fortified with Vitamin A.

Two years later, the Institute surveyed 30 families in each of 12 rural communities. Four out of five families were getting more than half of the Vitamin A they needed; and 10 of the 12 villages no longer had any children at risk.

and three times as many calories, per kilo of body weight, as an adult. It is also important to know that, because a young child's stomach is smaller, feeding needs to be more frequent.

In practice, applying such knowledge is not nearly as easy as it sounds for the poorest families. With 70% to 80% of family income being spent on food, poor mothers have to 'go for bulk' rather than nutritional balance when they shop for food. From an adult's point of view, that is usually the right thing to do in the circumstances. But a child simply cannot eat the cheaper low-protein foods like cassava in sufficient quantity to derive enough protein for growth. To get the same amount of protein as is contained in a handful of green beans, for example, a child would have to eat the impossible amount of 2.5 kilos of cassava.

Many attempts have been made by governments, international organisations, and commercial enterprises, to manufacture and market 'formulas' which provide the balanced weaning food which a child needs at a cost which the mother can afford. *Faffa* in Ethiopia, *Supramine* in Algeria, *Nutri-Nugget* in India, *Incaparina* in Guatemala – altogether some 86,000 tons a year of such formulated foods are manufactured for infants in 78 different countries. But in almost all cases they have proved to be too expensive to be within the reach of the very poor.

The more promising way forward to meet that need is again the spread of primary health care workers and women's organisations who can work with groups of mothers to prepare affordable weaning foods within the community itself. Skinned vegetables and soft fruits, mashed or ground and mixed with local cereals, can avoid the costs of packaging, marketing, transport and storage and are available to the poor at less than one-fifth of the cost of even subsidised weaning formulas.

This approach has multiple advantages – it can be integrated, for example, with hygiene education – and at no other time is the cleanliness with which food is prepared and stored as important as it is during weaning.

At the same time, the use of growth charts can be introduced and used both as a method of

nutrition education, as a means of monitoring the nutritional status of a community's children, and as a device for identifying children who are at special risk and in need of food supplements.

Family spacing

Food subsidies – of some kind – are therefore going to be essential if the growth of children of the very poorest families is to be protected and if deaths and disabilities are to be even more substantially reduced.

Unfortunately, knowledge of the dangers of low birth-weight – and the means of preventing it – is slow to spread. Out of several hundred supplementary feeding programmes recently surveyed by the Harvard Institute for International Development, for example, only 15% saw fit to include undernourished pregnant women among the eligible.

By contrast, the second of the changes in the lives of women which could have a dramatic impact on child health and growth is already gaining ground rapidly in the developing world.

Ten years ago, Dr. David Morley wrote that '*medical workers, when caring for a mother and her young child, will come to realise that delaying the next conception and extending the interval between births are quite as important a part of health care as seeing that the latest child is adequately immunised*'. Since then, the rapid spread of family planning has provided evidence from almost every country that birth-spacing can indeed have a revolutionary impact on maternal and child health. Studies in India, Turkey, the Philippines and Lebanon, for example, have shown that infant mortality rates for babies born within one year of a previous birth are between two and four times as high as for babies born after an interval of two years or more. A similar survey of 6,000 women in India has shown infant mortality rates of approximately 80 per 1,000 where the interval between births was three to four years – rising to 200 per 1,000 when the interval between births was less than one year (see Figure 1.17).

Empowering mothers with the knowledge and the means to increase the interval between births

Oman: defeating blindness

With imaginative 'social breakthroughs', low-cost attacks can be levelled at many child health problems which blight particular regions of the world. The eye infection called trachoma, for example, has brought permanent blindness to at least five million people in the developing world – and the majority of its victims are young children. Effective treatment in the form of preventive tetracycline ointment is now available. But health services do not reach most of the children who contract the inflammatory infections which can lead to blinding lesions on the eyes. So linking the known treatment with the known need demands imaginative new approaches.

In the Sultanate of Oman, where trachoma affects 80% or more of the child population in many areas and is the country's leading cause of blindness, the Ministry of Health launched an unusual trachoma control programme at the beginning of 1980. As the most vulnerable group is the schoolchildren, it was in the schools that the battle against the disease was fought.

It was decided at the outset that preventive ointment for all children – whether they had the

infection or not – was going to be more cost-effective than trying to screen out trachoma's victims. The major problem of too few health workers was boldly overcome. The health workers were to be the schoolchildren themselves.

In 372 schools, one student per class was chosen and given three days training in how to use the tetracycline ointment. At the end of each school day, the student health workers anoint all the children's eyes to cure or ward off the trachoma infection. With teachers supervising the operation and storing the jars of ointment, treatment is daily for two weeks a month over a three-month period.

In 1981, over 42,500 children in classes 1 and 2 had been treated. Follow-up surveys in 1982 showed that the effect had been dramatic. In the different regions of Oman, the incidence of trachoma in schoolchildren – who are also the main reservoir of the infection for the whole community – had fallen from 49% to 6% in Capital, 59% to 6% in Batinah, 91% to 10% in Nizwa, 80% to 11% in Ibra and from 76% to 9% in Rostaq.

is therefore a crucial contribution which family planning can make to health. But studies in both industrialised and developing countries have also shown that 'too many' can be almost as dangerous as 'too close'. Research in China, El Salvador, Chile and Britain, for example, has shown that the chances of survival for the first and second child are slightly higher than for the third child – and very significantly higher than for the fourth and fifth child in a family. Infant mortality rates in El Salvador were found to be around 60 per 1,000 for first-born children rising to 160 per 1,000 among fifth and subsequent children (see Figure 1.19).

Finally, births to women who are younger than 20 or older than 35 are also known to increase the risks to both mother and child. Studies in Algeria, Mexico and the United States have all concluded that a child born to a woman under the age of 20 is approximately twice as likely to die in infancy as a child born to a woman in her mid-twenties.* After the age of 30, the level of risk again begins to rise (see Figure 1.18).

These risks to life and health summarised by 'too close, too many, too old or too young' hold true for all income groups, though in each case the increase in risk is exacerbated by poverty. Even in the United States, it has been estimated that infant mortality rates could be reduced by almost a third if no women were to have more than three well-spaced births.

As relevant as any of these findings is a study which shows that most women do not need scientific surveys to tell them that too many births too close together is dangerous for their own and their children's health. Out of 21,000 women interviewed by WHO in several developing countries, nine out of ten knew that the health of both mother and child was better if there were fewer births and longer intervals in between. The recent World Fertility Survey has also reported that the proportion of women with three living children who want no more is over 70% in Sri Lanka, over 65% in Bangladesh, over 60% in Thailand and Peru, and over 50% in Costa Rica, Mexico, and the Dominican Republic (see Figure 1.20).

*Probably the major reason for this is that women who become mothers at a very early age tend to be both poorer and less educated.

Fig. 1.17 Birth spacing and infant mortality



Note: Space between births is the interval between the termination of the preceding pregnancy and the birth of the infant.

Source: Omran, A.R. & Standley, C.C., ed. *Family Formation Patterns and Health*. Geneva, World Health Organization, 1976, p.215
(data from South India Sample, 1971-1975, 6541 women).

In practice, many women do not have either the means or the freedom to exercise that preference. World-wide, at least half of the women who are now at risk of an *unwanted* pregnancy are not using any effective method of family planning.

Increasing women's own control over their own fertility is therefore a change which could clearly have a revolutionary impact on the health of mothers and the growth and survival of their children. And although there is a long way to go before that change is complete, recent progress has been, by any historical standards, remarkable. Only thirty years ago, there was not a nation in the world which was committed – even on paper – to the provision of family planning services. Today, 118 nations have adopted national family planning strategies and the speed with which the knowledge and the means to space child births has spread throughout the world is a tribute to the work of thousands of governmental and non-governmental organisations of all kinds who have helped to bring this change about. It is also one of

Indonesia and PNG: cretinism wiped out

The elements of the child health revolution discussed in this report are all low-cost interventions which have value wherever children fall ill and die unnecessarily. But low-cost solutions are also available for some of the major child health problems which affect particular regions of the world. One such problem is the lack of iodine in the diet.

Most common in high-altitude areas, usually far from sea coasts, iodine deficiency has been identified as the prime cause of goitre and of cretinism, which damages both mental ability and physical co-ordination.

Goitre and cretinism persist in Europe (Italy and Greece), in Africa (particularly Zaire), in South America (Peru and Bolivia) and in south-east Asia (India, Nepal, Burma and Thailand). Worldwide, several hundred million people are affected in some degree by iodine deficiency.

Iodine supplies the remedy – effectively and at very little cost. The needs vary in different areas, but 100 micrograms a day is generally considered adequate to prevent both goitre and cretinism. The technology for iodising salt, the simplest and most widely used method, has been known for almost 75 years. Iodine has also been added to bread, water, milk and even sweets (in Mexico). Another way of improving iodine levels is iodised oil, which

can be injected (every three to five years) or given orally (every one to two years).

A study in Papua New Guinea has shown the dramatic impact an intervention programme can have. Initially, some 100,000 people received iodised oil injections along with their regular vaccinations. Those who already suffered from goitre found that it improved substantially, and news of this quickly spread even to remote mountain villages. Popular support was thus mustered for a mass injection programme, followed by legislation for the iodising of salt in 1972. Ten years later a survey found that all children under nine – those born after the legislation – were completely free of cretinism and goitre.

In parts of Indonesia, over a million injections of iodised oil were given between 1974 and 1978, and 20,000 tons of iodised salt were produced each year to back up the injections. An evaluation in 1981 showed a 7% incidence of cretinism in children aged 7 to 16, but none at all in children under 7.

It is cheaper to give iodised oil by mouth than by injection, but even with injections, the cost has been estimated at only 7 cents per person per year. Given the funding, and the political will to tackle the problem, there is no reason why iodine deficiency should not be completely eradicated in less than ten years.

the best possible omens for a child health revolution. Not only is the idea of family-spacing itself spreading, but many of the networks and organisations which have helped it to spread are now turning their attention to other aspects of maternal and child health. An example of how the rapid spread of different kinds of development worker can open up new horizons are the 7,000 family planning workers who brought the means and the knowledge of family planning to a majority of Indonesia's 150 million people in only seven years and who are now working on nutrition programmes and promoting the use of growth charts in Indonesian villages (see panel No. 10).

Female education

For almost all children, the most important primary health care worker is the mother. For it is

usually the mother's level of education and access to information which will decide whether or not she will go for a tetanus shot; whether a trained person will be present at the birth; whether she knows about the advantages of breastfeeding; whether her child will be weaned at the right time; whether the best available foods will be cooked in the best possible way; whether water will be boiled and hands washed; whether bouts of diarrhoea will be treated by administering food and fluids; whether a child will be weighed and vaccinated; and whether there will be an adequate interval between births.

It is therefore perhaps not so surprising that the children of more educated mothers have, in general, more chance of both survival and healthy growth (see Figure 1.21).

What is more surprising is the sheer power of

Fig. 1.18 Age of mother and infant mortality

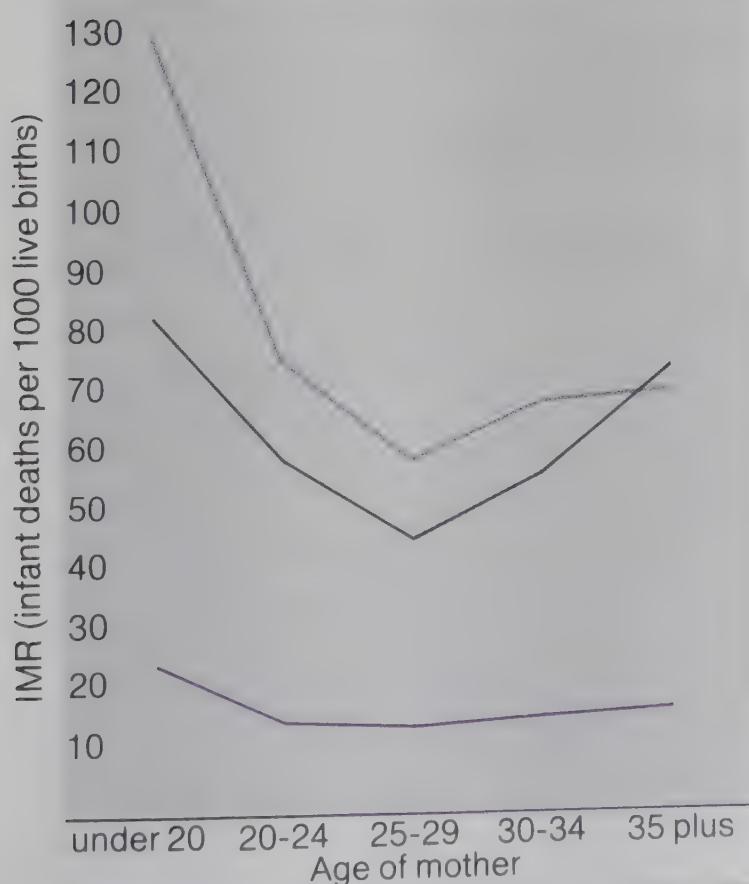
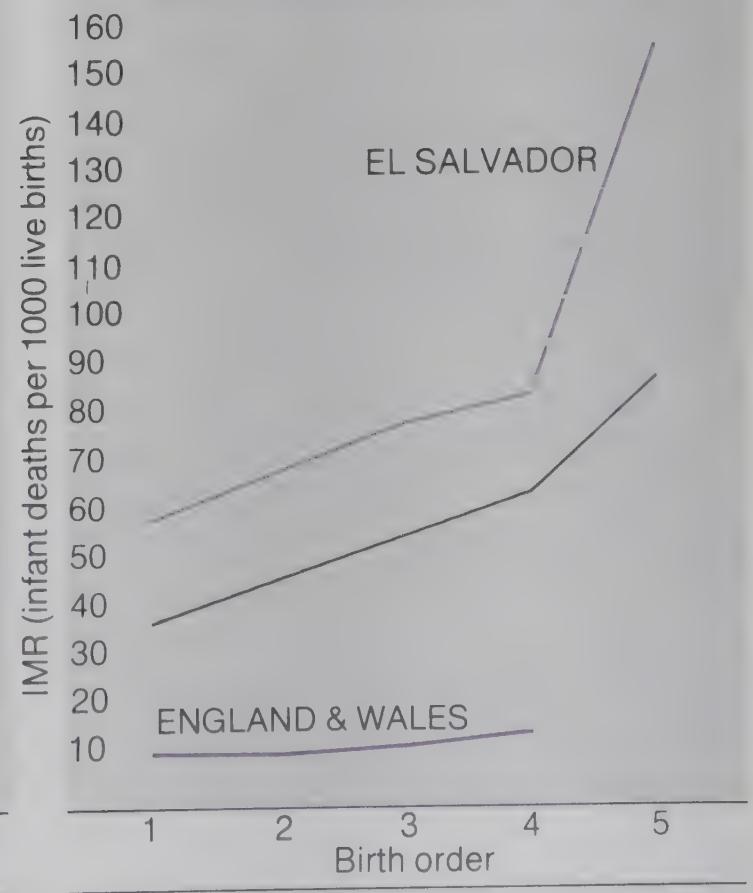


Fig. 1.19 Family size and infant mortality



Pakistan: accelerating health

Determined to cut back its high infant mortality (over 100 per 1,000) as speedily as possible, the government of Pakistan launched a three-year accelerated health programme in July 1982. Since the main causes of infant deaths in Pakistan are communicable diseases, low birth weight and birth injuries, and dehydration from diarrhoea, the programme is dedicated to three activities – immunization, the training of traditional birth attendants (who deliver nearly 80% of babies in rural areas), and oral rehydration therapy. None of these measures is new to Pakistan; but over the past years they have made little headway.

Pakistan now aims to immunize all its 15 million children by 1986 and the campaign has begun in every province. The new approach calls on all possible community resources, and not just on immunization staff.

In the district of Larkana in the province of Sind, for instance, a crash vaccination programme has been launched. The district immunization council, made up of the district administration, local voluntary organisations and community leaders, set an ambitious goal: immunizing all the district's children within four months in three one-week drives.

Massive publicity was organized to ensure community participation – banners with slogans, circulars to parents, public addresses, slide shows, leaflets, and door-to-door visits. Boy scouts, volunteers and social workers helped the parents bring their children to the vaccination points.

In the urban areas of Larkana, 90% of the target children were vaccinated in the first round, 74% in the second round, and 62% in the third. In the rural areas the crash programme reached 87%, 62% and 59%, respectively, in each round.

During the previous two years, each of Larkana's immunization centres had vaccinated, on average, only four children a day; and more than 80% of those children had never returned for their second and third doses of polio and triple vaccine.

The accelerated health programme aims at training 50,000 traditional birth attendants, so as to provide at least one for each of Pakistan's 45,000 villages and urban slums. The training curriculum has been revised to broaden their skills, and organisations other than the health services are encouraged to take part in the selection and training processes. In Mansehra district, in the North-West Frontier Province, for example, village health committees and local representatives select the attendants for the training, which is then undertaken jointly by the provincial health department and district councils.

The third component of the accelerated programme involves the distribution of oral rehydration salts. For its first year the programme aimed to distribute 5 million packets of salts, to rehydrate two million children; the previous year's figure had been only 1 million packets.

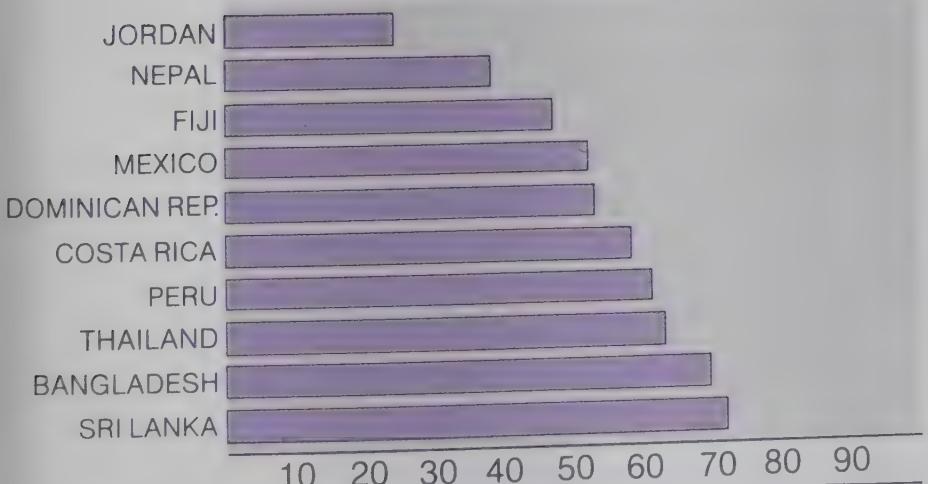
Despite some inevitable teething troubles, the accelerated programme has so far come close to meeting its ambitious goals. Three million children were immunized, against a target for the year of five million; 5,000 traditional birth attendants were trained, against a target of 8,000; and 5 million packets of oral rehydration salts were distributed as planned. This represents a tripling of the number of vaccinations over the previous year, and a five-fold increase in the number of birth attendants trained. The enthusiasm for immunization has been particularly marked. In the whole of 1982, 133 new vaccination centres were set up; during the first three months of 1983, 181 new centres have opened their doors.

the leverage which the educational level of the mother exerts on the well-being of the child – and the fact that this leverage retains so much of its power even in very poor environments.

In total, over 24 separate studies in 15 different nations have established that the level of the mother's education – even within the same economic class – is a key determinant of her children's health. In Pakistan and Indonesia, for example, the infant mortality rate among children whose mothers have had four years of schooling was found to be 50% lower than among the children of women who were illiterate. In eleven countries studied by the Latin American Demographic Centre (CELADE), the influence of the mother's education on the child's chances of survival was found to be stronger even than the level of household income. One particular study in Kenya has even gone so far as to say that 86% of the decline in infant mortality in that country over the last twenty years can be 'explained' by the rise in female education.

Empowering women by education is therefore the third of the improvements in the lives of women which could also have a revolutionary impact on the well-being of children. Whether she enters the work-force or not, investing in a minimum of four years at school for every girl is

Fig. 1.20 Percentage of women with three living children who want no more pregnancies



Source: Maine D. Family Planning. Its Impact on the Health of Women and Children. The Centre for Population and Family Health, Columbia University. New York, 1981.

Fig. 1.21 Maternal education and infant mortality

Deaths of children under 2 (per 1000) by education of mother in Latin America

| COUNTRY | None | 1-3 | 4-6 | 7-9 | 10 plus | YEARS OF SCHOOLING |
|---------------------|------|-----|-----|-----|---------|--------------------|
| PARAGUAY 1972 | 104 | 80 | 61 | 45 | 27 | |
| COSTA RICA 1973 | 125 | 98 | 70 | 51 | 33 | |
| COLOMBIA 1973 | 126 | 95 | 63 | 42 | 32 | |
| CHILE 1970 | 131 | 108 | 92 | 66 | 46 | |
| DOMINICAN REP. 1975 | 172 | 130 | 106 | 81 | 54 | |
| ECUADOR 1974 | 176 | 134 | 101 | 61 | 46 | |
| EL SALVADOR 1971 | 158 | 142 | 111 | 58 | 30 | |
| BOLIVIA 1975 | 245 | 209 | 176 | 110 | | |

Source: S.H. Preston, *Mortality Morbidity and Development*. Paper presented at the seminar on Population and Development in the ECWA Region. 20 September 1978.

one of the most cost-effective investments which any country can make in its own future.

In some parts of the world, there is still a resistance to the idea of female education among those who fear that it might also lead to the emancipation of women themselves. And worldwide there is still a significant difference between the enrolment – and the school drop-out rates – of boys and girls. Among 6–11-year-old children in the low-income countries, for example, about 90% of all boys and a little more than 60% of all girls are enrolled in school. Usually, the reasons for this discrepancy are to be found more in the society than in the school itself. Even 'free' education is expensive when parents are too poor to easily afford books, clothes, shoes and transport. For girls – who are often wanted to help with household tasks and child care and for whom education is often not considered to be so necessary – this expense may prove too much. So an investment which could improve life tomorrow is withdrawn to help cope with life today.

Despite this persistent discrepancy, education for girls is a change which is well underway. The proportion of 6–11-year-old girls who are enrolled in school in the poorest half of the world, for example, has jumped from 34% to 80% since 1960 (see Figure 1.1). By any standard, that is remarkable progress. And because of what it can achieve for both women and children, the rise of

female education deserves to be regarded as one of the great achievements of the last twenty years and one of the most hopeful signs for the next twenty. For that significant change in the education of girls during the 1960s and 1970s is now beginning to show through as a significant change in the proportion of mothers who are literate in the 1980s. And the fact that a much higher proportion of today's mothers are educated is another of those 'social breakthroughs' which can now help to put 'technological breakthroughs' into the hands of those who need them. Any attempt to promote the advantages of breastfeeding or to warn of the dangers of bottle-feeding, or to spread the knowledge of oral rehydration therapy, or to organise immunization campaigns at set times and places, or to introduce the use of growth monitoring charts or family spacing methods, now stands considerably more chance of success. For any mother who is literate has both more opportunity to learn about new ideas and more confidence to put them into practice.

Slowing population growth

These three improvements in the *lives of women*:

- More food for at-risk women and children during the crucial times of pregnancy, breastfeeding and weaning
- More choice for women over both the size of their families and the interval between births
- More education to increase women's access to vital information

- have also been shown to be amongst the most powerful of all influences on the state of the world's children. And it is not a coincidence that all of these policies were vigorously adopted by the People's Republic of China, the Republic of Sri Lanka, the Republic of Korea, Kerala and Taiwan, whose successes in achieving breakthroughs in health at low levels of economic development were described earlier in this report:

In these five successful cases, subsidised food for the poorest has significantly reduced malnutrition, health and family spacing services have been put at the disposal of every couple, and almost

100% of girls are enrolled in school. The fact that the rate of infant deaths in these areas is approximately 50% less today than the average for the developing world as a whole is testimony to the power of these changes.

But on looking again at these examples, there is one other common characteristic which is important to the idea of a child health revolution. In all of these cases, population growth has slowed down and birth-rates have fallen to among the lowest in the developing world.

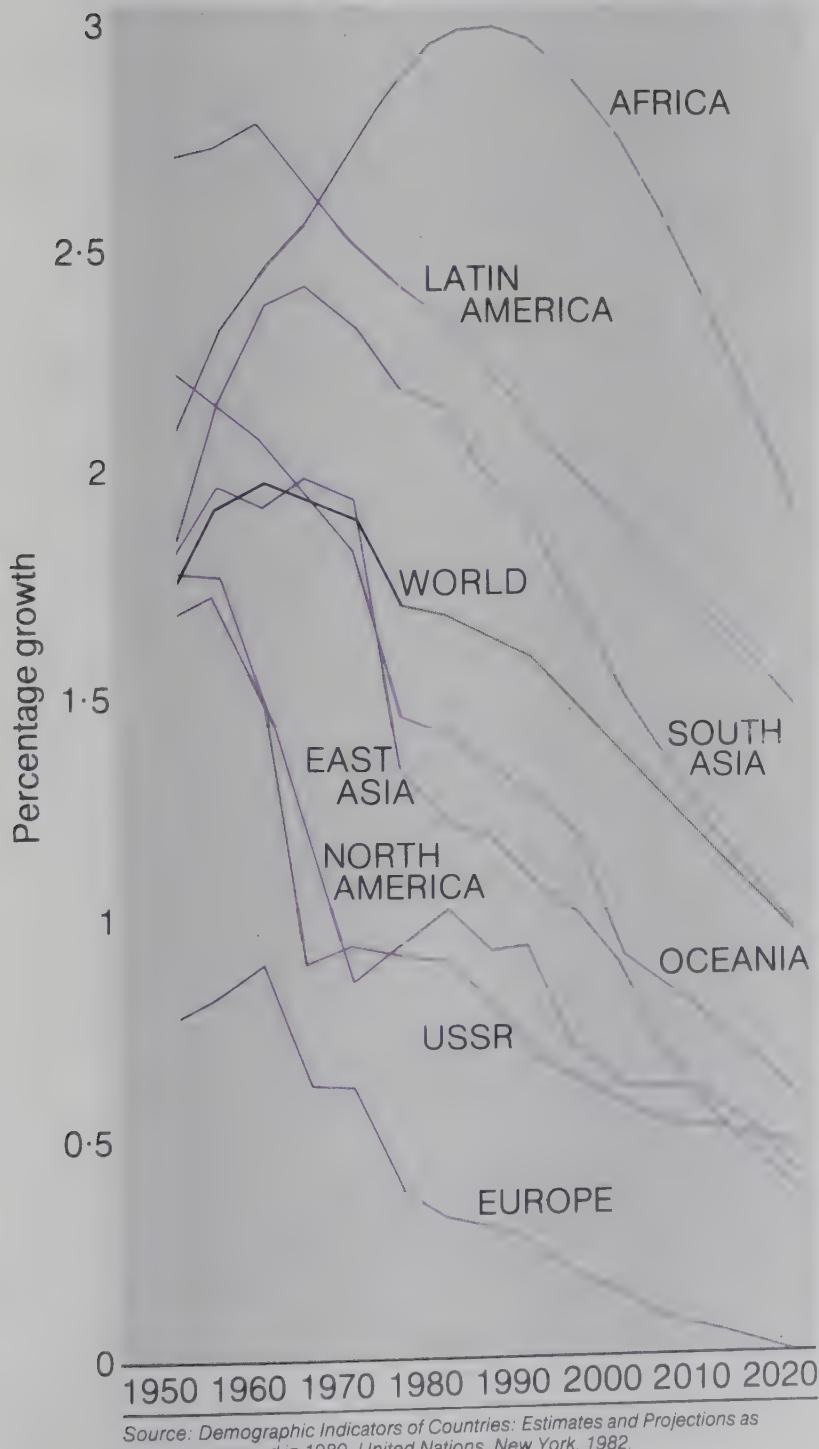
At first sight, it would seem paradoxical that the rate of population growth should fall when the rate of child survival has been drastically improved. But the explanation of that paradox should allay the fears of those who believe that a child health revolution would lead to another population explosion. For in practice, reducing rates of infant mortality is likely to help stabilise world population growth at a lower level and at an earlier time.

Child survival tends to reduce birth rates in three separate ways. First, child survival usually means that the mother continues breastfeeding. As is now well established, breastfeeding is a natural contraceptive, releasing prolactin in the mother's body and delaying the return of ovulation. In the case of Kerala, for example, the death of a child during the first month of life reduces the average interval between births from three years to less than two years. A child dying even in the second year of life reduces the average birth interval by almost six months. Similarly, studies in the Gambia have shown that if a baby dies in the first month of life then the average time before the next birth is only 16 months; if a Gambian child survives for the first two years, on the other hand, then the average gap between one birth and the next increases to about three years. In Bangladesh, the average interval between one birth and the next is also increased by more than a year if the first child survives its infancy.

Secondly, improved child survival means that the parents can more confidently give birth to only the number of children they actually want - rather than having extra children to compensate for the fact that one or two or more of their children might die. This link between surviving

children and family planning was one of the patterns which came under particular scrutiny during the Narangwal study. Its conclusion was that the fewer the children who died, the greater the likelihood that the mother would use an

Fig. 1.22 Annual rates of population growth, by region, 1950–2025



effective method of family planning – even among women with the same number of surviving children.

That is why this year's *State of World Population* report from the UN Fund for Population Activities concludes that '*birth-rates can be expected to remain high in countries where infant mortality rates are high*'. Meeting under the auspices of the US National Academy of Sciences, a committee of distinguished demographers has come to the similar conclusion that '*policies and programmes aimed at reducing infant and child mortality considerably below present levels may be an essential under-pinning of government programmes for fertility control ... as death rates are brought below 10–15 per thousand in present high-fertility, high-mortality countries, birth rates should be correspondingly reduced*'.

A third mechanism by which an increase in survival can lead to a decrease in births is both more profound and perhaps more powerful. Whether or not a husband and wife will decide to plan the number and spacing of their children is closely related to their own sense of control over their own lives and circumstances. Malnutrition, illiteracy, ill-health and oppression, can leave people with so little sense of control over their own lives and circumstances that they are alienated from the very idea of 'planning'. To expect adults who cannot control or plan any other major aspect of their lives to suddenly start planning just their families is to misunderstand what powerlessness means. If, on the other hand, progress in health and education, in political participation and economic activity, has helped to create a greater sense of mastery over one's own destiny – a sense that decisions can be taken, circumstances changed, and lives improved – then the idea of family spacing is likely to be welcomed as another opportunity to take more control over one's own life.

From this point of view, better health and growing confidence in child survival, especially if brought about in part by one's own decisions and actions, becomes a part of that change in mentality.

All of the strategies discussed in this report promote that sense of participation – that sense of

Thailand: training 6000

In 1975, scarcely a quarter of Thailand's population were within easy reach of government health services. To accelerate health improvement for the majority, and especially children, health spending was tipped in favour of primary health care; a national policy for primary health care was adopted in 1977.

The national programme builds on the experience gained in a number of experimental projects dating as far back as 1969. One of the most extensive of these was launched in 1975 in the northern province of Lampang, a region of rice farmers with a population of 660,000 in over 500 villages.

To support action for health, four new kinds of health worker were recruited and trained in Lampang province between 1975 and 1979:-

○ Full-time paramedics, known as *wechakorn*, were recruited from the ranks of existing health workers, mainly nurses, and given a one-year intensive training course in the most common health problems of the region. Most of the *wechakorn* were then assigned to rural health centres serving about 5,000 people.

○ In each village, a village health post volunteer (two in larger villages) was given two weeks training in health and nutrition education, family planning services, simple drug dispensation, and first aid. The volunteers were also taught when and how to refer more serious cases to more qualified people. Sales of basic drugs in the community were priced to allow the volunteers a small profit. All the volunteers were also entitled to free medical care.

○ Village health communicators, with only two days training, assisted the health post volunteer and took particular responsibility for groups of 10 to 20 families.

○ Traditional birth attendants serving the villages were given two weeks training in pre-and post-natal care.

By 1979, the primary health care staff trained and in action numbered 92 *wechakorn*, 918 village health post volunteers, 5,359 health communicators, and 352 traditional birth attendants. Over 28% of all requests for medical care and family planning were being handled by health post volunteers, and applications to hospitals were reduced.

Over the same period, the back-up system for the primary health care workers was also strengthened by the spread of rural health services. The number of child nutrition centres in Lampang, for example, rose from 11 to 100 and the number of district hospitals from two to seven during the course of the project.

Although there is a long way to go before 'health for all' becomes a reality in Thailand, health support is now within reach of two thirds of the Lampang population. Over the four years of the Lampang experiment, the proportion of young children making use of health services rose by 25%; the proportion of births attended by trained midwives doubled to almost 80%; and the proportion of women using health services increased from 30% to 45%.

being able to affect and improve one's own and one's children's lives. Therefore quite apart from the direct effect which campaigns to promote breastfeeding, birth-spacing, and female education might have on birth-rates, the bringing about of a child survival revolution by the strategies discussed in this report would in itself be likely to lower birth-rates.*

All of these mechanisms linking falling death rates to falling birth rates take time to work themselves through. In the recent past, it was this time-lag between falling mortality and falling fertility which resulted in the 'population explosion'. So even though a child survival revolution would lead – eventually – to falling birth rates, wouldn't population growth again increase sharply during the 1990s? The answer is almost certainly 'no – not this time'.

The reason is that the length of time it takes for birth rates to fall in response to a fall in death rates seems to depend on the degree of progress in reducing death rates which a nation has already made. In the post-war period, a definite pattern seems to have emerged. If a nation's death rate is very high – say, 25 per 1,000 – then reductions in that death rate tend to take quite a long time to produce the corresponding reduction in the birth rate. If, on the other hand, a nation's death rate has already been reduced to as low a figure as 15 per 1,000 – then beyond that point further reduc-

*If increased child survival did not have any effect in lowering birth rates, then it would obviously lead to an increase in population. But as fertility rates are already declining quite steeply in most parts of the developing world, the new 'survivors' would not add as much to future population growth as would have been the case in the past (see Figure 1.22). Even if the infant mortality rate in the developing world were to fall overnight to European or American levels, for example, and even if this did not lead to any reduction in the birth-rate, the overall impact would be that world population would be stabilised at approximately 9.3 billion as opposed to 8.5 billion some time towards the end of the next century. *Because declining infant mortality is known to influence people towards smaller families, a halving of infant death rates would almost certainly result in a further slow-down in the rate of population growth and a lower final total.*

tions in the death rate have usually been associated with a much more rapid and steep fall in birth rates. Almost all the countries which had lowered their overall death rates to 15 per 1,000 by the early 1960s, for example, have subsequently seen their birth rates fall by a multiple of every further and subsequent one-point fall in the death rate.

In Thailand, for example, a fall in the death rate from 15 to 8 per 1,000 between 1960–1981 was accompanied by a 14-point fall in the birth rate. Similarly in the Philippines, a fall in death rates from 15 to 7 over that same period was accompanied by a 13-point fall in the birth rate. Colombia, Turkey, Malaysia, the two Koreas, Lebanon, Mexico, Costa Rica, the Dominican Republic – all had death rates of between 10 and 16 per 1,000 in 1960. All of them have since reduced those death rates by a further 5 to 9 points, and in all the birth rate has declined by between 9 and 19 points. And if, as in all of these cases, the birth rate is declining faster than the death rate then, by definition, population growth is slowing down.

The importance of this trend is that the overall death rate in the lower-income developing countries (excluding China where death rates have already been reduced to less than 10) is now approaching that critical death-rate figure of 15 per 1,000. In other words, many nations are now at the point beyond which each further advance in lowering the death rate should, on the evidence of demographic history, lead to a much greater fall in the birth rate.

In sum, a revolution in child survival is likely to result in a slowing down of the rate of population growth and to contribute to the stabilisation of world population at an earlier date and at a lower total. As some measure of how significant that contribution could be, India would today have approximately 4.4 million fewer deaths each year and 7.5 million fewer births each year – resulting in a much lower rate of population growth – if the entire nation had the same low death rates and low birth rates as the state of Kerala.

Nepal: corner shop care

In most developing countries the official health services now reach only about a quarter of the population. If new low-cost ideas and technologies are to be put into the hands of those who need them most, then not just the health services but every possible other channel will have to be used. Often, that will mean opting for the unconventional approach.

In Nepal, only one person in five lives within easy reach of health services and the government health centres themselves often run through their year's supply of drugs within the first three or four months. So people with health problems have to seek help wherever they can. Usually, that means consulting one of the country's two thousand local drug-sellers.

Many of the drug-sellers are village shopkeepers with a few popular drugs on their shelves. But they are often respected members of the community with more education than most. And through their hands pass 90% of all the drugs and antibiotics which enter Nepal each year. Until now they have needed neither training nor qualifications nor licences to import and sell such drugs, and most of their information about them comes from travelling drug-company representatives. About one third of their wares are 'tonics' conferring no known benefit. Other items on their shelves include dangerous drugs which have been banned in other nations.

It was the drug retailers themselves, acting through their own professional association, who

approached the Institute of Medicine in Kathmandu asking for help in raising their own professional standards. Seeing the opportunity, UNICEF's Kathmandu office agreed to pay for training courses for the drug retailers. In co-operation with the government of Nepal, purpose-designed 40-hour training courses have been set up at times and places designed to fit in with a shopkeeper's business hours. So far, 500 drug retailers have been through the course. On the way, they have learnt to advise people about the correct use of medicines and to recommend appropriate drugs for the treatment of some common health problems. Those who pass the final exam leave the course equipped with a professional certificate and a detailed handbook to guide them in their work.

The training has brought about notable changes in the drug retailers' ways of doing business. In Kathmandu, for example, they have voluntarily ceased over-the-counter sales of a once popular but highly addictive sedative. Customers with a persistent cough are no longer sold antibiotics or just another bottle of cough medicine: most trained retailers now advise them to go to the nearest clinic for a tuberculosis check-up.

Most important of all, in a country where diarrhoeal disease causes so many infant deaths, many retailers are now not only stocking and selling packets of cheap UNICEF-subsidised oral rehydration salts but carefully briefing mothers on how to mix and administer the contents of the packets and stressing the importance of rehydration therapy.

Inner Development

The combination of breakthroughs in knowledge, techniques and social organisation which are coming together at this time could and should make it possible to bring about a revolution which can save the lives of 20,000 children every day, prevent an equal number of disabilities, and promote the healthy growth and development of many millions more. Furthermore, the confidence and sense of greater control over their own lives which families and communities can gain through simple, affordable, and visibly effective strategies, can both help to slow down population growth and help to build community acceptance of, and enthusiasm for, the wider ideal and infrastructure of primary health care itself.

The knowledge and techniques by which this can be achieved ought now to be communicated world-wide in order to put them at the disposal of every nation, every community, and every family. For the surest guarantee of permanent and self-sustaining improvement in the life of any community is the organised and active participation of that community itself.

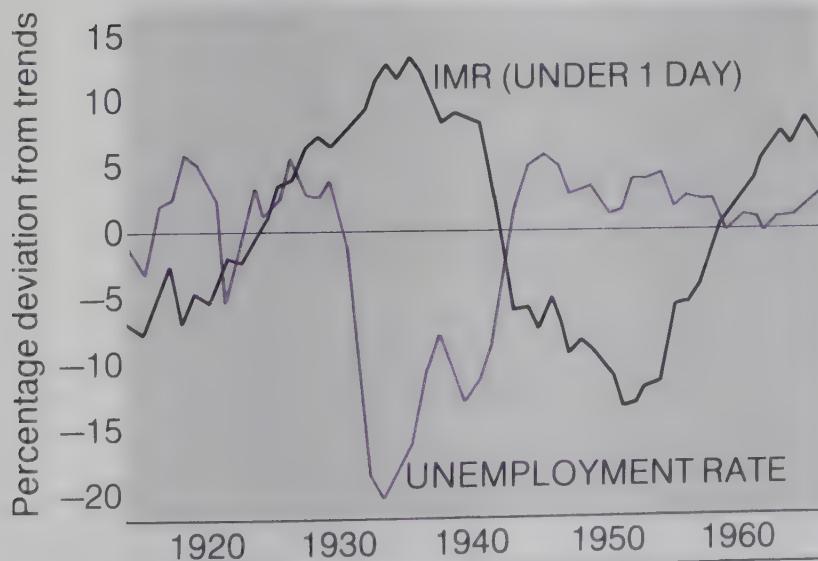
It can, of course, be said that the strategies which can bring about these drastic improvements in child well-being do not tackle the fundamental causes of poverty and ill-health. In

considerable measure, this is true.

It is true, for example, that in the developing world as a whole the poorest 40% of the people share only about 10% to 12% of their nation's income and that income is also one of the most important determinants of child health and well-being (see Figures 1.23, 1.24, 1.25). In New Delhi, for example, the infant mortality rate in the mid-1970s was found to be 180 per 1,000 among the children of those who earn less than 20 rupees per month as opposed to only 12 per 1,000 (lower than the average for the United States) among the children of families earning more than 300 rupees a month. Similarly, the infant mortality rate among the rich of a city like Port-au-Prince, Haiti, is the same as in the United States – whereas one child in every five dies in the slums of that same city.

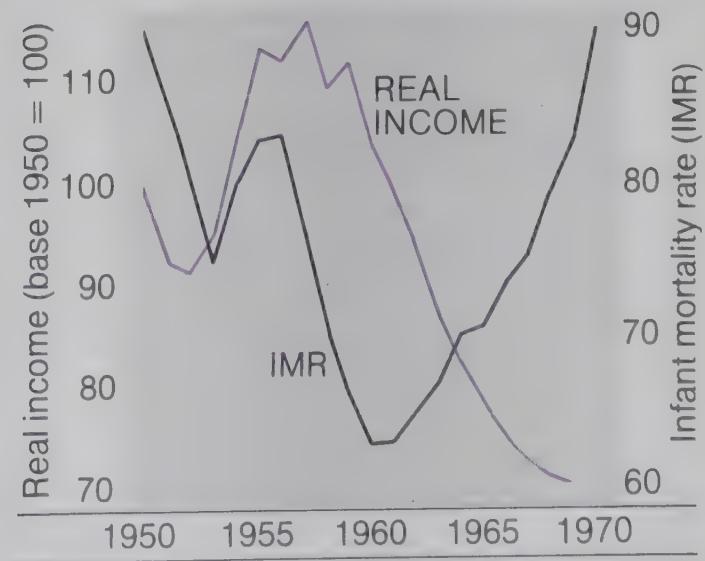
It is also true that in many nations the poorest 40% of people in the rural areas may own only 1% or 2% of rural land and that landholding – which of course affects food and income – is also an important influence on a child's chances of health and survival. In Guatemala or Bangladesh, for example, infant mortality rates have been found to rise steeply as the size of family landholding falls (see Figure 1.26). And in many parts of the

Fig. 1.23 Economic trends and IMR (first 24 hours), United States, 1915–1965 IMR = Infant deaths per 1000 live births



Source: H. Brenner, *Fetal, Infant & Maternal Mortality During Periods of Economic Instability*. Int. J. Health Services 3:145-159, 1973.

Fig. 1.24 Income and infant mortality, Sao Paolo, 1950–1970



India: the Anganwadi solution

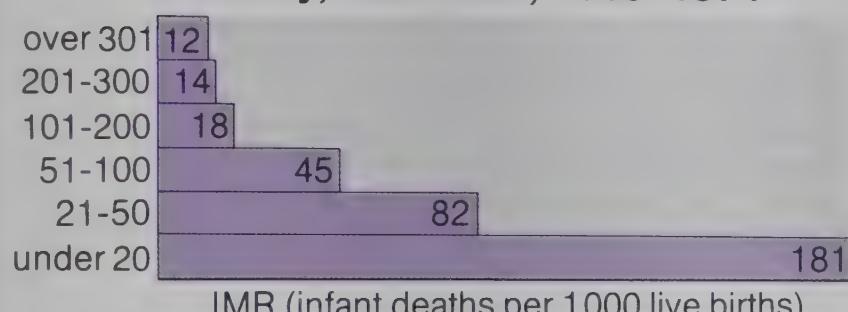
In some of the poorest villages and slums of India, the Integrated Child Development Services Scheme is succeeding in improving children's well-being with very limited resources. The heart of the strategy is the *anganwadi* centre, in the care of a specially trained woman chosen for her knowledge of the area and its people. So far, *anganwadi* centres have been set up in 300 rural and urban projects with a total population of about 30 million people. By 1985, the government of India proposes to establish 1,000 such projects.

The *anganwadi* worker herself receives a small monthly payment and spends about three quarters of her time in teaching families better hygiene and nutrition, organising supplementary feeding for children seriously at risk, providing non-formal pre-school education for children, and conducting functional literacy classes for women. Just as important, she is the focal point for integrating all other child services available to that community. It is through the *anganwadi* centre, for example, that the immunization teams work and that the visiting paramedics provide health check-ups, pre- and post-natal care, and treatment of common local illnesses. From the community's point of view also, the *anganwadi* centre is a focal point – the place where families can bring their children in the knowledge that the *anganwadi* worker will be able

either to help herself or to call in whatever help might be necessary.

To assess the impact of the *anganwadi* centres and the integrated child development services which work through them, 28,000 children in different 'blocks' were surveyed before the *anganwadi* workers took up residence and the scheme began. Three years later, researchers returned to those same blocks to carry out a similar survey. The results:-

- The proportion of children immunized against diphtheria, pertussis and tetanus had risen from 5% to 35%. Against tuberculosis, immunization rates had doubled to 44%.
- Sixty-one per cent of children had received health checks as opposed to only 18% before the *anganwadi* centre was opened.
- Over half of the children were receiving vitamin A supplements to prevent blindness. Before the scheme began, only 10% of children were protected.
- The proportion of children receiving supplementary food had doubled to 55%.
- The proportion of children found to be severely malnourished was down from 19% to 11%.

Fig. 1.25 Income and infant mortality, New Delhi, 1969–1974

Source: Ghosh, et al., 1979.

world, half of the young children are malnourished whilst half of the land is used to grow cash crops for export to those who can afford them rather than food crops for consumption by those who need them.

Greater justice, both within and between nations, is therefore of fundamental relevance to the well-being of children. Within nations, even moderate measures to help the incomes of the poorest 20% grow just a little more quickly would greatly reduce the incidence of malnutrition by the end of the century. Between nations, one-quarter of the annual *increase* in the industrialised world's wealth could double the *total* annual budgets for both health and education combined in all the developing nations.

The industrialised nations, containing a quarter of the world's people, still control more than three quarters of the world's wealth. By and large, that gives them the power to lay down the rules of world trade, regulate the workings of the international monetary system, decide what investments will be made and where, determine the course of scientific and technological research, and organise the international division of labour largely in their

own interests. As a result, the majority of developing countries have correspondingly little control over the price they receive for the raw materials they have to sell, or the price they pay for the manufactured goods they have to buy, or the value of the currency they must use, or the world monetary system within which they must earn their living, or the terms of the investments they seek, or the amounts and conditions of the aid they receive.

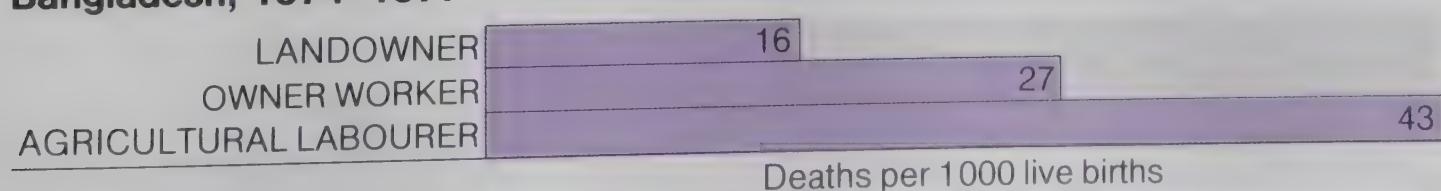
All of these are fundamental problems having a direct effect on national revenues, on governmental services, on employment opportunities, on family incomes, and therefore on children's well-being. Their solution depends on the long struggle for economic growth, economic justice and social development.

Progress in solving these problems is tragically slow. And for at least the next few years, the fact must be faced that there is little likelihood of any vast increase in the scale of resources available for development. In that context, the emergence of low-cost opportunities to re-gear the ratio between resources and results and accelerate progress for the world's neediest children cannot be ignored.

Exactly ten years ago, those children were made a promise by the international community. At the closing ceremony of the World Food Conference in 1974, the objective was proclaimed 'that within a decade no child will go to bed hungry, that no family will fear for its next day's bread, and that no human being's future and capacities will be stunted by malnutrition'.

Tonight, more children will go to bed hungry, their capacities stunted, than on the night those words were spoken.

How much longer are we going to ask them to

Fig. 1.26 Occupation of household head and child death rate, Matlab, Bangladesh, 1974–1977

wait? Definite actions with definite results, actions capable of large-scale impact at relatively low financial and political cost, are available *now*. And they are actions in which almost everybody can be involved.

Nor should it be assumed that these actions are not addressed to some of the fundamental problems of world poverty. Inasmuch as they can put into people's hands and minds the means to bring about improvements in their own lives through their own efforts and their own organisations, they can help to build a sense of self-respect and

self-determination and create an ethos which contributes to further progress and greater justice.

And inasmuch as they can play a part in one of the most fundamental tasks of all – the protection of that process of 'inner development' in the growing minds and bodies of young children – they can help to break into the cycle by which poverty and injustice have so long been perpetuated. That is why the child health revolution touches the roots of the development problem. And that is why it offers new hope for today's children – and tomorrow's world.

Recession: The impact on children

During 1983, a special study *The Impact of World Recession on Children* has been prepared by UNICEF staff and field offices assisted by an international panel of distinguished economists. The study, including ten country case studies,* appears in full in the hard-cover edition of *The State of The World's Children 1984* – available through Oxford University Press and from UNICEF Offices. The following is a brief synopsis of its evidence and argument.

The world economy is now in its deepest and most sustained recession since the Great Depression of the 1930s. Yet in all the recent writings on recession, not a single study has looked at its impact on the most vulnerable half of the world's people – the children.

The main problem facing any such study is the lack of even elementary statistical information about changes in child well-being. For most countries, rich or poor, it is easier to find out how many dishwashers have been sold than it is to find out how many children have been immunized. What is needed, in all countries, is a *child monitoring system* to provide an early warning of any deterioration in the well-being of the rising generation.

Despite this deficiency, fragmentary evidence of the recession's impact on children is beginning to surface in different parts of the world. In Zambia, information from the poorer northern regions is indicating a fall in children's height-for-age. In São Paulo, the proportion of low-birth-weight babies is rising. In Costa Rica, the number of children being treated for severe malnutrition has doubled between 1981 and 1982. In the USSR, infant death rates have risen sharply. And in the United States, infant mortality rates have also risen in areas such as Alabama and Michigan, which have been particularly hard hit by recession.

As these examples suggest, it is usually the poorest members of society who are most exposed.

In all countries, the poor spend a greater proportion of their incomes on necessities such as food or fuel or basic medical care. Any decline in that income therefore threatens not just material progress but the ability to maintain health and life. In such circumstances, the risk is greatest to the growing minds and bodies of young children.

Multipliers

This economic vulnerability is paralleled by the political vulnerability of the poor. Many of the mechanisms

which link the international economic system to the poor neighbourhoods of the developing world are mechanisms which act like reverse shock absorbers – increasing the impact of recession as they pass that impact down the line. It has been estimated, for example, that a 1% fall in the rate of growth of the industrialised countries tends to produce a 1.5% fall in the average rate of growth of the developing countries. Within the developing nations themselves, an echo of that same process passes the economic shock-wave on to the poorest sections of their own societies. A 2% to 3% decline in the average income of a developing nation, for example, can easily result in a 10% to 15% decline in the income of the poorest classes. Finally, this same process may happen again within the poor communities themselves: in many societies, females and young children depend on what is left – of the evening meal and of the weekly wage – after their husbands and older sons have met their needs.

By such mechanisms is the greatest burden of the world economic recession passed on to those who are least able to sustain it. Ironically, the main protection for the very poor has been the fact that so many of them live in rural areas which are only peripherally linked to the world economy. Although many of the rural poor have escaped the full impact of the recession, drought and poor harvests have had a serious effect, particularly in the last two years.

Falling Incomes

Family income is perhaps the main medium for the transmission of recession's impact to the children of the poor. And in many parts of the world, average real family incomes have fallen, often sharply and over several years, as a result of the recession and worldwide inflation. In the Latin American region, for example, average incomes have now been in decline for two consecutive years. Income per person in Brazil fell by over 4% in 1981 and by almost another 2% in 1982. In Chile, per capita GNP fell by 15% in 1981 alone and in Costa Rica real incomes have fallen by as much as one-third. These averages often disguise even steeper declines among the poor and unemployed. Africa, the continent with the least to fall back on, has undoubtedly been hardest hit in recent years. Real per capita income in more than half the countries of Africa is less today than ten years ago. With recession in many countries compounding the effects of drought, wars, and the long-term set-backs of inflation and oil price increases, overall per capita GNP in Africa south-of-the-Sahara fell by an estimated 2% between 1979 and 1980 and is expected to show another 2% decline for 1982.

*The countries selected are Tanzania, Sri Lanka, India, Zambia, Nigeria, Brazil, The Republic of Korea, Chile, Costa Rica, and Cuba.

Hardest hit of all are the nations dependent on raw material exports to the industrialised world. In 1982, for example, the world price of copper fell to its lowest level for 50 years: in copper-dependent Zambia, government capital expenditure has been cut by two-thirds and average incomes have been almost halved in recent years. Least affected of all the regions of the developing world is Asia, where many nations are protected from the worst effects of recession either by their relative self-sufficiency (as with China and India) or by their past economic progress.

Although recession's impact differs from nation to nation, most of the countries for which data are available are showing an increase in the number of children living below national poverty lines and a widespread deterioration in the quality of children's lives.

Welfare cut-backs

Alongside falling family incomes, cut-backs in government services for children are the other main medium by which economic recession is transmitted to the lives of the young. Because social welfare programmes, and particularly those for children, are usually not protected by powerful interest groups, and because they are often erroneously regarded as 'uneconomic', they generally suffer quickly and disproportionately from any forced cut-backs in government expenditure in both industrialised and developing countries. Under the impact of recession the share of government expenditure devoted to basic needs programmes has declined in many nations.

Overall, the economic recession has contributed to a decline in both the quality and quantity of services for children – from maternal and child health clinics and immunization programmes to supplementary feeding and primary schools.

Policies

Fortunately, economic set-back and child well-being are not linked in a fixed ratio. Several nations have achieved levels of health and education for their children which are measurably higher than other nations where average incomes may be twice as high. The impact of world recession on children is ultimately more a matter of political policy than of economic inevitability. Within the developing countries, policies to protect children from recession should begin with the recognition that investments in the health and education of the young should be the last, not the first, to be cut back. Economic adjustment policies should be consciously designed to restructure in ways which protect children, the poor, and the vulnerable – not ignore them or sacrifice them in the name of economic efficiency. Whether judged by hard-headed economic calculation or by the elementary tenets of human

welfare, protection of the physical and mental capacities of a nation's people and a nation's future is the most fundamental of all investments. The maintenance of basic services, minimum standards of nutrition, health, education and household income, is therefore the first and most important line of defence for a nation's children. In practice, that defence will usually require a more equitable distribution of income.

Internationally, protecting and improving the lives of children could be helped by ending recession and reviving economic activity through the lowering of interest rates, import duties, and trade restrictions by the industrialised nations. At the same time, the immediate policy of the main international financial institutions needs to be reviewed to stop the main burden of recession from falling on the poorest people and to protect high-priority social and health services. And although such appeals continue to echo emptily down the corridors of power, higher levels of development assistance, equivalent to only a very small percentage of the world's current expenditure on armaments, could and would improve the lives of the world's children.

The Response

The evidence we have of a deterioration in the lives of children should be taken as a clear warning. For, almost certainly, the worst is yet to come. The impact of recession takes time to work through the channels which lead to children. And our knowledge of that impact, in the absence of any systematic and sensitive child monitoring service, also lags behind the event.

Our response to this warning must be both humane and 'realistic'. The recession is a fact of life. And it means that there will almost certainly be no large-scale increase in the level of resources available for improving child well-being in the poorest half of the world during the 1980s.

What we are now faced with is therefore a challenge to policy. All countries should review their national and international policies to assess their impact on children, the poor, and the vulnerable – and to see how that impact can be ameliorated. The fact of recession means that progress for children now will have to depend more than anything else on improving the ratio between resources available and results achievable. It is in this overall context that the 1984 *State of the World's Children* report is presented. For the high-impact, low-cost strategies which it draws together are examples of what can be done to streamline the effort to improve the lives of children so that progress may be maintained and accelerated even against the headwind of world recession.

II

LIFELINES

Six essays on the potential contribution of
the principal strategies discussed in this
year's State of the World's Children
Report.

1. Oral Rehydration Therapy

Dr. Jon E. Rohde, Head of Management Sciences for
Health, Port-au-Prince, Haiti.

2. Growth Monitoring

Dr. David Morley, Professor of Tropical Child Health,
University of London, United Kingdom.

3. Expanded Immunization

Dr. Ralph Henderson, Director of the Expanded Programme
on Immunization, World Health Organization, Geneva,
Switzerland.

4. Breastfeeding

Dr. Natividad Relucio-Clavano, Chief of Paediatrics, Baguio
General Hospital, Baguio, The Philippines.

5. Family Spacing

Dr. Joe Wray and Deborah Maine, Center for Population
and Family Health, Faculty of Medicine, Columbia
University, New York, U.S.A.

6. Food Supplements

Dr. Kusum Shah, Associate Professor of Obstetrics and
Gynaecology, Grant Medical College and J.J. Government
Hospital, Bombay, India.

Opinions expressed in this chapter are those of the
individual authors and do not represent official statements
by UNICEF itself.

Oral Rehydration Therapy

by Jon E. Rohde

Jon E. Rohde is Representative, Management Sciences for Health, Department of Health, Port-au-Prince, Haiti. After five years as Staff Associate to the SEATO Cholera Research Laboratory in Dhaka (1968-73) he became Visiting Professor of Medicine at Gadjah Mada University, Yogyakarta, in Indonesia. He has been a consultant on national programming in nutrition, primary health care, and urban health systems to the World Bank, UNICEF, WHO, IDRC, and various NGOs such as BRAC and OXFAM, and for national programmes in several developing countries. His main fields of research include nutrition, infant mortality, the epidemiology of cholera, and diarrhoeal and infectious diseases.

There are diseases whose very names strike terror: plague, for instance, or polio or smallpox. And there are others which are regarded as nuisances, like the common cold or 'having the runs' – inconvenient but not serious.

And yet the deadliest killer of small children in the world is one of these everyday illnesses. In the poorer communities of Asia, Africa and Latin America, five million children die every year of diarrhoeal infections. From this cause, a child will have died in the time it has taken to read this paragraph: one, on average, every six seconds.

The number of diarrhoeal attacks leading to this staggering total of deaths is even more overwhelming: a billion or more bouts a year. In one hospital in Yogyakarta, Indonesia, fully one third of child admissions were for diarrhoea, and this holds true for practically all hospitals in developing countries. Moreover, in a study of infant and child deaths in Latin America, two thirds of the deaths by infection were found to be caused by diarrhoea.

Such totals are too large to be truly comprehended. And a problem so daunting could tempt even the well-meaning to give up. But there is a solution at hand, one so simple it seems almost too good to be true.

The key fact to remember is this: diarrhoea kills through dehydration. Although a great array of bacteria, viruses and parasites can cause the diarrhoea, it is not usually these pathogens in themselves but the loss of water and salt from the

body that brings about death. So diarrhoea therapy does not have to entail laborious and costly searches for the pathogens themselves, nor are drugs necessary. Normal body mechanisms will fight off the pathogens within two to five days; and in any case, there is no known drug treatment for most diarrhoeal pathogens. Therapy needs only to focus on replacing the body's lost salts and fluid.

In the past, fluid replacement was considered a clinical problem challenging the finest arts of the paediatric specialist and his sophisticated laboratory. Intravenous infusions in expensive rehydration units saved the majority of those few who were within reach of such treatment. We have now learned that the same results can be accomplished using ordinary sugar, salt and water mixtures, costing only a few cents, and administered promptly by mouth under the most basic of circumstances. The costs and complications of intravenous treatment need never enter into the picture.

The recipe for oral rehydration salts is very simple: the critical ingredients are 20 grams of glucose and 3.5 grams of salt to a litre of water. If glucose is not available, household sugar (sucrose) will do, at 40 grams to the litre. UNICEF's packets of salts – following an agreed WHO/UNICEF formula – are a little more sophisticated: they include 2.5 grams of sodium bicarbonate (baking soda) and 1.5 grams of potassium chloride, both elements that are lost in the diarrhoeal stool. While neither of these is essential to the treatment, they improve its effectiveness. Fortunately, potassium is found in many tropical fruits, including bananas, papaya, and green coconut water.

It's a formula that belongs to the kitchen rather than the laboratory; and it has been in the making for a long time. The salt-and-water combination had been used as far back as 1849, when Dr. John Snow observed that his cholera patients improved when a weak saline mixture was injected into their veins: 'The shrunken skin becomes filled out,' he wrote, 'the countenance assumes its natural aspect; the patient is able to sit up and for a time seems well.' Only for a time – because the treatment was stopped when the patients seemed better.

It took another century and another cholera epidemic, this time in Egypt, for Dr. R.A. Phillips to recognise that the fluid replacement therapy did in fact work as long as the saline mixture was given in large volumes, matching the liquid lost by the body, until the diarrhoea stopped.

But not until the mid-1960s did Phillips and others prove the true importance of sugar. Diarrhoeal disease interferes with salt transport across the intestinal wall, but glucose transport is not markedly hindered; so the glucose carries the salt and water with it.

The dramatic impact of oral rehydration was first demonstrated when cholera swept through the refugee border camps during the 1971 Bangladesh war of independence. In one field unit, staffed by paramedics under the direction of a doctor, as many as 3,000 patients were treated in three weeks. Up to 200 new cases were admitted daily to a centre where even the space on the mud floor was covered in purging patients. Two out of every five patients were children, some in coma.

Usual nursing procedures were impossible. Intravenous solutions were saved for those in profound shock and oral rehydration was administered to the rest.

Despite the inevitable confusion, the death rate was a startlingly low 3.6% and half that rate was attributable to patients who died on admission before rehydration could be attempted. By contrast, the mortality rate of the few who made it as far as the established hospitals was 25%. Even under hospital conditions in Italy, when just 278 patients were treated for cholera in 1973, the death rate was 9%. In other words, oral rehydration therapy is not just a cheaper and more available treatment; it is also – in almost all cases – the *best* treatment.

The other advantages of oral rehydration therapy are several. The salts are very cheap – even the individually foil-wrapped UNICEF packets cost only 6–8 cents, and bulk-bought quantities distributed at community centres in plastic bags, folded paper, or banana leaves work out at 2.5 cents a packet. The ingredients are easily available everywhere in the world. The dangerous side-effects of intravenous therapy – cardiac failure through

rapid over-rehydration, for instance, or sepsis due to contaminated fluids – are so rare as to be almost unknown in oral therapy. And, most important of all, the treatment can be administered by non-professionals. Parents themselves can give it to their children as soon as the illness begins.

Britain's leading medical journal, *The Lancet*, described the discovery that glucose accelerates the body's absorption of salt and water as 'potentially the most important medical advance this century'. But that tricky adverb, 'potentially', points to the second major difficulty in vanquishing the killer diarrhoea.

It is near-miraculous news that oral rehydration salts are an effective enough medicine to treat 900 million or more of the billion bouts of acute diarrhoea each year, provided the treatment is started early and then kept up – but it can only cure those sufferers who have access to it. How is a mother in a remote village in a developing country to know that a remedy has been found to cure her child's sickness?

When diarrhoea strikes in its most violent form, as cholera, the world sits up and takes notice. And there is usually a rush to try to provide medication. But most of the billion bouts of diarrhoea go unnoticed; each episode seems only a matter for individual discomfort. The medication remains at the health centre. And as a mother whose infant has a loose bowel movement is no more likely to drop all her work and rush the child to a health centre than you or I are to take a day off work and hang around the doctor's surgery every time we have a headache, the gap between the remedy and the illness remains.

The mother will, perfectly reasonably, trust that the child will get over the diarrhoea in a few days – it's happened often enough before. And she will also recognise that giving the child something to drink results in more and messier stools, so she withdraws food and liquid to 'let the stomach rest'. The child's own inclinations appear to confirm her actions: he is fussy and off his food.

Unfortunately, this commonsense approach doesn't accommodate certain vital realities. One is that withholding fluid deprives the child's body of the very liquid he most urgently needs. Although

Oral Rehydration:

A statement from WHO and UNICEF

Excerpts from:

The Management of Diarrhoea and Use of Oral Rehydration Therapy,
A Joint WHO/UNICEF Statement,
World Health Organization,
Geneva, 1983

- In 1980 in the developing countries, an estimated five million children under 5 years of age – about 10 every minute – died as a consequence of diarrhoeal disease (*mostly as a result of dehydration*).
- Oral rehydration therapy (ORT) can prevent and correct this dehydration and thus prevent many of these diarrhoea-associated deaths. This technological breakthrough offers important new possibilities for reducing the number of deaths in children because it can be used throughout the health care system and can even be administered in the home by family members.
- Diarrhoea is also a major factor in the causation or aggravation of malnutrition... Such malnutrition is itself a contributing cause to the high number of deaths associated with diarrhoea in childhood. Thus, continued feeding, both during and after a diarrhoea episode, is an important part of the proper management of diarrhoea, complementing ORT.
- ORT is a simple, inexpensive, and effective therapy; ensuring that it is widely available and widely used is a major public health challenge. WHO and UNICEF, as well as numerous international, bilateral, and voluntary agencies, are now collaborating with many countries in establishing national primary health care services which include diarrhoeal disease control programmes with ORT as their cornerstone...
- A rational response to diarrhoea is as follows:
 - (a) To prevent dehydration using solutions prepared from ingredients commonly found in the home ('home remedies'); this should be the first response;
 - (b) To correct dehydration using a balanced, more complete, glucose-salt solution; ORS [oral rehydration salts] is the universal solution of this type recommended by WHO and UNICEF;
 - (c) To correct severe dehydration (usually defined as loss of 10% or more of body weight) by intravenous therapy; this method should also be used in patients who are unconscious or unable to drink.
- About 90–95% of all patients with acute watery diarrhoea, including infants, can be treated with ORS alone; in the remainder, most of whom have severe dehydration or are unable to take fluids orally, intravenous therapy is required to replace the deficits rapidly... In contrast to intravenous therapy, ORS can be given under simple conditions and does not require any special equipment or highly skilled personnel...
- While the use of ORS may initially require more health workers' time to train mothers to give ORS to their children, in the long term it frees hospital and health centre staff for other duties. Of greater importance, ORS involves parents directly in the care of their children and presents an excellent opportunity for health workers to communicate important health education messages on diarrhoea prevention and nutrition.
- ORS is associated with very few side effects ... [and] has been found to be remarkably safe.
- In a number of research studies the use of ORS for treating dehydrated children at the community level has decreased the number of deaths from diarrhoea by as much as 50–60% over a one-year period...

giving the salts may increase the stooling, or even vomiting, for 12–36 hours, from then on it will diminish the diarrhoea. And it is important to start rehydrating the child as soon as possible; by the time a worried mother feels she must take her dehydrated child to a doctor it is usually too late for simple remedies – or indeed for any remedy at all.

The second reality is that even if the child pulls through this episode of diarrhoea and appears to be his normal self a few days later, the illness will in fact have cost him dearly. Every day of fasting will have lost him 1 or 2% of his body weight.

Part of the loss will be due to his mother's withholding of food, and to his own disinclination to eat. In addition, the diarrhoea will have reduced the absorption of nutrients from what little he does eat. And his body will have used up its meagre stores of energy to recover from the illness.

The resulting diminution in the child's growth will not be visible to the naked eye. But it is a severe blow to his nutritional status. And each blow of this kind will make him that much more vulnerable to another attack of illness – perhaps to a similar dose of diarrhoea in a few weeks' time. But this time diarrhoea could be fatal.

Or perhaps the next illness will be measles, or just a cold – the final straw will be identified as the 'cause' of death; the weakening of the child through successive bouts of diarrhoea may not be recognised as playing its deadly part. Since a child sick with diarrhoea is more likely to become malnourished, and a malnourished child is more likely to catch an infection, a terrible downward spiral is in operation, leading ultimately to death.

In the developing world, where a child may average three or four bouts of diarrhoeal infection a year, being ill can seem the norm rather than the exception. Before the child has a chance to recover fully from one illness, he will be laid low with the next: one step forward, two steps back, until he is too weak to make any more steps forward.

This vicious synergism of malnutrition and infection must, therefore, be resisted with an equally determined and powerful synergism of services: both the infection and the malnourish-

ment must be addressed, so that each intervention enhances the impact of the other.

Oral rehydration can halt the immediate effects of one kind of malnutrition – the loss of water and salt from the body. But to counteract protein-energy malnutrition, the mother must encourage her child to eat. In the case of a baby, she must breastfeed more, not less. Fortunately, nature has organised the body so that it can gain weight at up to several times the normal rate in the convalescent period (that doesn't require the child to consume several times as much food – double the usual calorie requirement and a relatively modest protein intake will achieve maximum growth rates). A full recovery will then only take one to two days for each day of illness.*

But can poor families afford more food for their sick children? On their own some families are simply too poor. But the benefits of community mothercraft centres in Haitian villages have provided a hopeful answer. Malnourished children were fed daily for four months at the centres on local food purchased, cooked and served by their own mothers under the guidance of a village nutritionist.

A year later, assessments still showed a large, positive nutritional impact on the recipient children – and, more remarkably, on 96% of their younger siblings, who weighed more than the recipient children had weighed at a comparable age. In fact, their mean weight was 3% more than that of the control group, who came from families well enough off for their children not to require nutritional therapy. Furthermore, this effect on the siblings was achieved by the mothers alone, with practical guidance but no food supplements.

This is not to deny poverty is the underlying cause of ill-health in the developing world. As E.H. Kass observed, when he noted that even a century ago infant mortality was already low in royal families: 'Clearly, rich is better'.

*If the child is not fed (or breastfed) throughout the diarrhoea, his growth will be set back by each new attack. This setback will be imperceptible in the usual way of things, but a growth chart will pick it up, and will enable the mother to see with absolute clarity not only how her child's growth falters during an attack of diarrhoea, but also how quickly it returns to normal if she provides extra nourishment. Growth monitoring is discussed in another chapter of this report.

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But emphasising the importance of specific interventions like oral rehydration therapy and extra feeding during convalescence in no sense runs counter to broader political efforts to decrease poverty and improve social conditions. On the contrary, it is a way, so to speak, of jumping these children temporarily into a higher economic bracket. At least as far as their health is concerned, children with access to oral rehydration therapy and convalescent feeding will be 'richer' during their crucial, formative years. And a bright-eyed child with energy to learn will benefit more from other social and political interventions – like education, for example – than a sick child using all its energy to survive.

The present problem facing health educators, then, is not a technological one: a remedy exists that is both medically and socially relevant. The problem is one of communication.

Health systems are usually passive entities: they wait for their patients to come to them. But, as we have seen, mothers do not perceive childhood diarrhoea as a dangerous disease that warrants approaching a health centre. Indeed, some Javanese mothers who were interviewed believed it to be a sign of intellectual attainment. How is this cultural divide to be overcome?

The health educator's usual approach is to challenge and replace the beliefs of the target group – a slow, thankless and often inappropriate task. But there is another method: do as the advertisers do. Instead of assaulting deeply held beliefs, one can ride on concepts that already exist. It is not essential to persuade mothers that diarrhoea is a problem of sodium transport in the intestinal wall – only to persuade them that *drinking is the right response for diarrhoea*.

Different concepts of diarrhoea drawn from several cultures suggest a variety of 'marketing strategies' to validate the idea of drinking:

- Diarrhoea is a cleansing of the body. Fluids are washed through, removing bad elements. Drink to replenish water, the cleansing element of the body.
- Think how weak plants become during a drought. During diarrhoea, the body also becomes dry as water goes out. Like any grow-

ing thing, the body needs plenty of water for strength.

- Diarrhoea is a 'hot' illness and results from an imbalance of forces in the body. Restore the imbalance with a drink that has the appropriate 'cold' response.

Once the concept of drinking is institutionalised, it is relatively easy to move on to what the most appropriate drink would be.

Communication also involves changing the perceptions of other members of the culture in which the mother and child live. It implies reaching decision makers at village meetings, in local women's groups, and opinion leaders among the working classes. And the involvement of young people through schools can mean the oral rehydration message being delivered into almost every home.

The mass media – billboards, radio, television, newspapers – can also spread the word that drinking is the right response for diarrhoea.

But it is foolish to create a demand for a product that is insufficiently available. UNICEF now produces over 20 million packets of oral rehydration salts a year, and up to 60 million are locally produced. But even that is clearly only a fraction of the quantity needed to reach 500 million children at risk in the developing world. The major source of rehydration salts must be mixtures prepared at home by mothers, either approximations of the UNICEF mixture or mixes based on traditional home remedies.

Recent experiments show that some traditional remedies, like carrot soup and rice-water, are on the way to being effective means of oral rehydration. Starch is a polymer of glucose, and studies show that it may be ideal for diarrhoea treatment. When starch-based solutions are given in combination with supplemental feeding, the fluid is absorbed faster, the stools are less, the diarrhoea stops sooner, and the child may even gain weight.

Initial scepticism about the ability of mothers to prepare accurate enough rehydration solutions from household ingredients is abating; studies from around the world show that poor teaching methods rather than the mothers' abilities are usually to blame for failures. For example, when

more than one and a half million Bangladeshi mothers, almost all illiterate, were taught to make a solution with unrefined palm sugar, coarse sea salt and drinking water in a common household vessel, monitoring showed that 98% of the mothers could remember how to prepare an acceptable solution.

In Indonesia, a plastic spoon was given to mothers as a measuring aid for making up a glassful of mixture. One glassful, the simple message went, was to be given to the sick child for each liquid stool. Even a year later, the solutions the mothers made up with this spoon were as accurate as those made up from the ready-made

packages. And the plastic spoon served another important function. On it was printed a reminder: 'After five glassfuls – seek a health post.'

In the task of reaching *all* children, the mother is the most important primary health worker. She is who is present throughout her child's illness. She is who cares for this child above all others. The obligation placed on all of us – government officials, doctors, health educators – is to do everything we can to help the mother to help her child in the fight against childhood's worst enemy. To do less is to waste the one asset beyond price: the mother's commitment to the well-being of her child.

Growth Monitoring

by David Morley

David Morley is Professor at the Tropical Child Health Unit which he established at the Institute of Child Health of the University of London, and Director of the Foundation for Teaching Aids at Low Cost (TALC). He is the author of many articles and papers on childhood disabilities, child nutrition, immunization, ORT, etc., and of Paediatric Priorities in the Developing World and See How They Grow (co-author). He received the first King Faisal International Health Award in 1982.

Health professionals have still to convince politicians that growth in early childhood is the basis of national development. In many developing nations, up to a quarter of all children are malnourished. Many die. Many more will be physically stunted, ending up no more than 150 centimetres or five feet in height. Worse still, inadequate brain growth is likely to make schooling difficult and many malnourished children will grow up without the degree of mental development necessary for life in the twenty-first century.

Nor have we in the health services been able to convince the politicians that health care systems can materially improve the mental and physical

growth of small children. Yet in several parts of the world, it is now being shown that even within existing health budgets – or for very little extra in the way of resources – the growth of children can be significantly improved.

The piece of 'technology' which makes this possible is a simple cardboard or thin plastic growth chart, kept by the mother, and costing between two and ten cents. Through the regular monthly weighing of all young children and the entering up of the results on a growth chart, children at risk of malnutrition can be identified. With the appropriate help and advice from health workers, parents can then protect the development of their children. And in so doing, they can protect and improve the economic and social development of their nations.

This revolutionary potential of the child growth chart is not, as yet, widely understood. In part, this is because malnutrition itself is not widely understood.

It is still commonly believed, for example, that malnutrition is caused by lack of food and particularly by lack of protein. Yet in perhaps half

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of all cases of child malnutrition, infection is the prime cause. Measles, whooping cough, tuberculosis, and especially frequent bouts of diarrhoeal infection, along with fevers, respiratory infections, and internal parasites, can all contribute. These illnesses depress the appetite, consume the energy, drain away the body weight of the child, and lead to malnutrition.

In addition, the gruel or pap eaten by most small children is so bulky that the child may need to eat a kilogram of this each day to satisfy nutritional needs. Even children with no infection cannot eat this amount. This leads to an energy or calorie deficit not found in more developed countries where oils, fats, and energy-dense weaning foods are available. Because of this, many millions of children are malnourished, even in homes where adequate food is available.

A third major cause of malnutrition is the lack of everyday nutritional knowledge – knowledge about the superiority of breastfeeding over commercial formulas, about when and how to begin weaning, about how to make the best diets out of available resources.

Malnutrition must therefore be tackled on three fronts – by increasing available food, by better protection against infection and illness, and by more education.

A second great misconception about malnutrition is that it is an obvious and visible condition. In practice, most mothers of malnourished chil-

dren do not know that anything is wrong. Their children's growth curve may be flattened and their growth permanently stunted, but as nearly all the children are like this, the parents consider this lack of adequate growth to be normal.

A child who is malnourished will conserve his or her energy for survival and growth. There will be little or none to spare for play and exploration. So just at the time when a normal child is becoming really mobile and active, the malnourished child is cutting down on activity in an attempt to preserve normal growth. That is why so many children in the developing world are found sitting about or standing still rather than dashing around learning through play (see Figure 2.1).

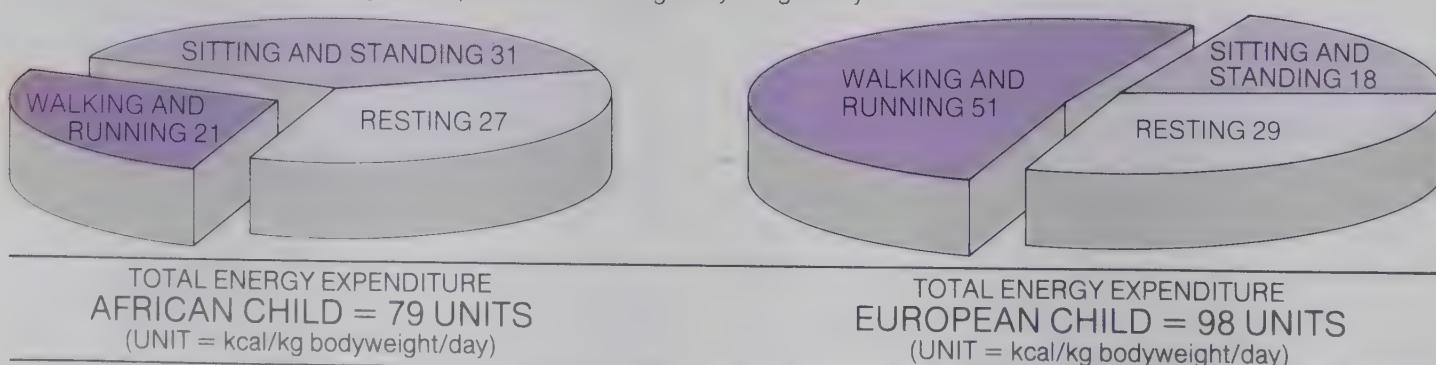
The result is that the malnourished child is also deprived of the stimulus and the interaction with the environment which is also vital for his or her mental development. And there is increasing evidence that the lowered potential which results may be permanent.

But for most children, inadequate food and health care will also mean that some growth is sacrificed. According to the latest figures from the World Health Organization, for example, there are now almost 40 million children in the world who are 'wasted' with weights below the minimum weight-for-age.

The essential value of the growth chart in combating this tragedy, is that it makes malnutrition visible to the health worker and others in the

Fig. 2.1 Estimated energy expenditure of African and European children

Calculated from observed activity and expressed as kcal/kg body weight/day



Source: Davies, T.P., Parkin, J.M. (1972) 'Catch up Growth Following Early Childhood Malnutrition', *E. Afr. med. J.*, i, 539-42 (88)

A European child may spend up to two and a half times as much energy on walking and running as a child in a malnourished community in Africa. The reduced activity of the

malnourished child comes at a time when play and exploration of the environment is important in the development of physical and mental skills.

home who can understand the symbolism of the chart. Each month, the child should be weighed, either at the clinic or in the home or at any regular meeting of mothers. Strong inexpensive market scales are adequate for the purpose, and health care workers do not need lengthy or complicated training to weigh young children, although teaching them to complete and interpret the growth chart so that they can give advice does take time.

This process of regular monthly weighing will reveal whether or not the child is steadily gaining in weight. This is the single most important indicator of a child's healthy, normal development. If the child does not gain in weight from one month to the next - or, worse, if weight is actually lost - then the chart will make this apparent to the health worker and she can explain to the mother what needs to be done. For most children this will involve increasing the 'energy density' of the food by adding oils and fats if these are available. Instead of eating a kilogram of food a day, the child needs to get the same energy from 500 grams. In as many as half of all cases of child malnutrition, it is the invisibility of the problem rather than the lack of food in the family which is the principle constraint on improving the nutritional status of the child.

For the health worker, the growth chart represents a valuable opportunity to discuss child health and nutrition with each individual mother, and father where possible. Through the growth curve the health worker can identify when growth is inadequate and mothers can also come to understand more about malnutrition - and about the relationship between health, diet, infection, and growth.

A child who has just had measles or suffered an episode of diarrhoea, may well have lost weight from one month's weighing to the next. Understanding that it is infection which is the cause, can lead to a mother understanding the health worker's advice about the necessity of continuing feeding even during diarrhoea; about the use of oral rehydration solution; about the importance of measles immunization or the introduction of weaning foods. It is this informed involvement of the mother in the struggle to make sure that the child puts on weight each and every month which

is perhaps the greatest contribution the growth chart can make to child development and child health.

At no time is this more important than when weaning begins. At the age of approximately five or six months, breastmilk alone may no longer be sufficient. Supplementary foods must be introduced as soon as the growth curve falters. The growth chart is the best indicator of when a supplement should be added. Enthusiastic mothers in more developed countries are demonstrating that they can successfully breastfeed beyond six months; their children gaining weight adequately and not showing signs of anaemia or other problems. But in developing countries where supplementary foods often have to be prepared with unclean water in inadequately washed containers and in an environment seriously contaminated with children's and animal's excreta they bring with them a very substantial increased risk of infection and consequent malnutrition. It is for this reason that so many communities postpone weaning until the child is one or even two years old. But by that time, malnutrition in the form of stunted growth is certain.

For the child whose growth is being charted, however, it is obvious when supplementary feeding should begin. And with the assistance of a health worker, the right supplementary foods can be chosen and perhaps advice can be given on how to prepare and store them safely. In this way, many of the dangers of these especially vulnerable months may be avoided.

In the developing world, growth charts were first used in the village study of children in West Africa. Their use is now spreading, albeit slowly, throughout the developing world and a collection of 280 such charts has recently been collected and analysed by the Institute of Child Health, University of London. The results - and suggestions for appropriate chart designs - are available from the Institute*. (See examples of growth charts on page 24)

On the more recent charts the child's weight is not compared with growth lines representing an

*Institute of Child Health, University of London, 30 Guilford Street, London.

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'average' child (a method which may be unnecessarily worrying to the mother). Instead, the chart emphasises only the child's own weight gain from month to month. On some, there are two growth lines and the child's own curve should simply run parallel to them, whether above or below. On others, the range of normal growth is depicted by a rainbow curve of five different coloured bands. Each child is said to have his or her own colour and should grow along it. Mothers are then taught that a rising line means a healthy growing child, a level line indicates that more appropriate food is needed. A falling line is a danger sign which usually indicates that more food and a health worker's advice are urgently required. Mothers need to be encouraged to feed their children more during and after infections. So often the maldistribution of resources, between North and South, within countries, and even within the community and the family, makes this difficult or impossible.

In addition to the principle task of monitoring growth, the charts can carry other messages vital for the protection of child health. They have a space for recording immunizations and the age at which these should be given.

The charts may also record details which indicate whether a child is at higher risk of illness and death than the average. There is now widespread acceptance of the fact that five to ten per cent of children are in this high risk category and channelling extra care and resources to such children can significantly reduce child deaths. Low birth-weight, for example, is one of the factors which can be recorded on a child's growth chart and which indicates a significant increase in risk throughout the early years of a child's life.

A high proportion of charts also now contain information on the birth of other children into the family – as well as advice on family planning. This development is a welcome shift in emphasis from family size to family spacing – encouraging a gap of three or more years between each birth as was the tradition in almost all countries a century ago. An adequate interval between births could, in itself, do much to improve child survival and child health in the developing world today.

Tough hanging scales from which are sus-

pended plastic pants or a locally made basket, are now widely used to weigh children. A new development is to have a pointer on the back of the scale. Instead of recording the weight as the pointer on the front does, this pointer which faces the mother moves over a drawing suggesting how long the child should be breastfed or when he will stand and walk. It is hoped this will make the weighing process more interesting and meaningful to the mother and help in health education.

Growth charts can also, of course, be used to record other body measurements. In emergencies – for example, in famines or in refugee camps – the height-for-weight wall 'thinness' chart is particularly useful. The child is first weighed and then asked to stand in front of the wall chart so that his or her head is in the right column for the child's weight. If the top of the head reaches into the red area then it is likely that the child is too thin and is 'wasted'. If the top of the head only reaches to the green area in the column, then the child's weight is appropriate for its height. Such charts can be used to identify children and families who need supplementary feeding.

Finally, charts are also now being developed to monitor child growth even where weighing scales are not available. Of these, perhaps the most useful are the charts based on measuring arm circumference.

Thanks to pioneers like Dr. Shakir and Dr. Echeverri and others, the arm circumference band has now been refined and is likely to become increasingly popular over the next few years. This simple insertion-tape is placed around the upper arm and, as it is drawn tight, a plastic cursor is moved along the tape. Tape and cursor are then placed flat on the growth chart. The edge of the cursor now indicates the arm's circumference and a dot can be put on the chart. Using this method, even partly-literate health workers can maintain an adequate growth chart.

The great advantage of the arm circumference charts is that measuring tape is light and cheap compared with weighing scales. The plastic tape costs only a few cents and can be carried into every home – thereby opening up the possibility of reaching those in all societies who do not attend clinics and whose children are at particular risk.

The use of growth monitoring as an aid to child health and child development is taking off in certain countries. In Indonesia, for example, 2.5 million young children are now being regularly weighed each month under a nutrition programme which is now receiving the assistance of the 7,000 family planning workers who have so successfully brought the knowledge and the means of family planning to the majority of Java's 100 million people. In Thailand, growth charts now regularly record the growth of over a million under-fives. In Pakistan, children are now being regularly weighed at 1,500 Maternal and Child Health Centres and the idea is soon to be introduced by a further 1,000 Family Centres and several non-governmental organisations.

Despite these advances, only a small minority of the world's young children are being regularly monitored for normal healthy growth. As the network of primary health care and community development workers expands, this proportion is increasing. But part of the problem is that the concept of following a child's pattern of growth as a curve on a graph is not easily accepted by many nurses and doctors. There are several reasons for this – including the fact that medical education is still orientated towards the management of relatively rare conditions and towards curative care in large institutions. There seems to be a regrettable lapse of 10 or even 20 years after the introduction of the growth chart idea before it becomes part of a health worker's education. Unfortunately, the use of simple growth charts is still not taught to the majority of medical and nursing students across the world.

Lastly, growth charts are valuable as a source of standardized information which can paint a larger picture of community health. Properly managed, this information can help local authorities and national governments to identify districts most in need of assistance and to evaluate the impact of development programmes. Collectively, the information gained from growth charts can also help to measure the effect of irrigation schemes or crop failures. And as a sensitive measure of nutritional status, varying even from month to month, they can act as an early warning signal for an impending famine.

The supportive relationship between growth charts and primary health care is a reciprocal one. Growth charts, kept and used by the mother, are a way of informing and involving a community's parents in the promotion of health. At the same time they can be a catalyst for the acceptance of, and support for, primary health care programmes themselves.

For all these reasons, the potential impact of growth charts is nothing less than revolutionary. But from all the experience gained through the use of growth charts in the many different nations, it is clear that the chart can only be truly effective if used as one of the tools in the community health programme. Outside that context, it is simply just another good idea. Both the backing of the health services and the participation of the community – and especially the mother – are necessary for growth monitoring to make its contribution to the development of children – and of nations.

Expanded Immunization

by Ralph Henderson

Ralph Henderson has held several senior posts with the Center for Disease Control in the United States. From 1966 to 1969 he was Deputy Chief of the Smallpox Eradication/Measles Control Program for West Africa. He joined the World Health Organization's Expanded Program on Immunization in 1977 and became its Director in 1979. In 1981, he was appointed Assistant Surgeon-General of the United States Public Health System.

With each passing minute, ten children die and another ten children become lame, deaf, blind or mentally retarded from six diseases which can be prevented by immunization: diphtheria, whooping cough, tetanus, measles, poliomyelitis and tuberculosis.

Only rarely does any of these kill a child in Europe or North America. But in the developing world, measles kills some two and a half million children a year, whooping cough claims the lives of a million and a half more, and tetanus still remains unchecked, killing another million newborns every twelve months. Tuberculosis remains a major problem in most developing countries and diphtheria strikes in isolated but lethal epidemics. Meanwhile, almost 30 years after the vaccine to prevent the disease was discovered, half a million children in the developing world are still being crippled by polio each year.

These six killer diseases are now the target of the Expanded Programme on Immunization (EPI), a world-wide enterprise in which WHO, UNICEF and many other organizations in almost every nation of the world are now collaborating. The overall aim of the EPI is to make immunization against 'the big six' available to all children in the world by 1990. At the moment, only about 20% of the 100 million children who are now born every year into the developing world are being immunized.

Five years after the launch of the EPI more than 130 countries and areas in the developing world have launched their own EPIS to the standards agreed by the World Health Assembly. Over 100 of these countries are now reporting the incidence of all the EPI diseases and 116 are now reporting the percentage of children under one receiving immunization protection. World-wide,

more than 1,000 senior national and international staff have participated in intensive EPI management courses and a total of more than 10,000 middle-level managers have been trained. Many countries – including notably the Congo, Gambia, Kenya, Mozambique, Tanzania, Sierra Leone, Sri Lanka, Thailand and India – have made very considerable progress.

But overall, the EPI is not on target. The goal of immunizing all children in the world in the seven years between now and the target date of 1990 is threatened. And if the targets of EPI are not achieved, then it is certain that the goal of 'Health for All by the Year 2000', surely one of the greatest aspirations ever set before mankind, will not be achieved either.

With the technology already available, why is immunization coverage spreading so slowly? There are many answers and many different problems in different countries. But there is also one constant theme running through them. The great problems facing EPI now are not technical or scientific – they are human and organizational.

Proof of that most central truth about the present status of immunization in the world has been provided by the achievements of the People's Republic of China where, in recent years, an excellent immunization service has been established on a large scale *with existing technologies*.

In most other parts of the developing world, where almost exactly the same technology is available, immunization has reached a far smaller proportion of children. And the main difficulties have not been in vaccines or cold chains or syringes or needles but in commitment, organization, training and management.

The government funding for EPI activities is usually inadequate. The right quantity and quality of staff may not have been recruited. Training may not have been adequate. And those who are trained may not have been given the responsibility and authority to see through the tasks essential to a programme's success. Supervision may be so weak that immunization staff are not held accountable for their performance. Training and supervision may become more and more dilute as it reaches out from the national level.

Parents – and their communities – may remain unconvinced of the need to bring their children back for the three or four immunizations necessary for full protection. These are the common failings which restrict the reach of immunization's arm.

The training of 12,000 national and international staff by the EPI is an important start. But few national programmes have so far developed the ways and means to pass on the necessary technical and supervisory skills to hundreds and thousands of middle- and lower-level health workers who must ultimately carry out the immunization programmes on the ground. That is why the World Health Assembly, reviewing the overall progress of the EPI in 1982, identified the lack of human resources in general and management skills in particular as the main programme constraints.

To organise, on a continuous basis, the immunization of several million children during their first year of life whether they be in city slums or desert camps or mountain villages is a management problem of formidable dimensions. Add to it widespread illiteracy, inadequate roads and transport systems, rising fuel prices, budgetary cutbacks, lack of electricity for cold storage of vaccines, and over-stretched health services often reaching only 25% of the population, and we begin to see the true scale of the difficulties facing those involved in expanding immunization. And it is against the sheer scale of those difficulties that the present threats to success should be seen.

More and stronger management is therefore necessary for accelerating the EPI's progress. But there remains the question of what the managers are to manage. Immunization services are only part of the answer. The great severity of the vaccine-preventable diseases in the developing world is due to a vicious cycle of infection and malnutrition, with either factor capable of initiating the cycle. Children often have their defence mechanisms compromised from the start by low birth weight, and then are assailed by a series of stresses which include whooping cough, measles and weaning on top of repeated episodes of diarrhoea and malaria. Each event sets the child back in growth and development and, if the

interval between events is too short, the child cannot recover and dies.

Immunization services alone can be a good entry point for the development of other health services, because they are simple to administer and do not require a complex change in attitudes or life-styles on the part of the mother or the child in order to be effective (other than the changes required to obtain the immunization service itself). By preventing specific diseases which can precipitate malnutrition (especially measles and whooping cough), and by permitting children longer recovery periods between the events mentioned above, immunization can help break the vicious cycle and contribute more broadly to the reduction in childhood mortality.

But while immunization services can be delivered alone, they are best delivered along with other services needed by children in their first year of life, and by pregnant women: the persons who constitute the priority groups for primary health care services in the developing world. In addition to the monitoring of the growth of the child, the use of oral rehydration to treat diarrhoea and the promotion of breastfeeding, these services may include malaria treatment and prophylaxis, and counselling with respect to child spacing, nutrition during pregnancy, weaning, clean water and sanitation. Not only do such services act in synergy to break the cycle of infection and malnutrition, but the availability of each service helps promote the utilization of the other services by the population concerned, leading to greater efficacy and lowered cost per service delivered.

This approach calls for the EPI to be promoted as part of primary health care. This adds to the effectiveness of the EPI, and in this way, the EPI can directly contribute to the strengthening of the other primary health care services.

But there is an additional aspect of primary health care which is of critical importance to the EPI: the involvement of the community as an active partner in the planning, implementation and evaluation of the services. It is not uncommon in the developing world for only one half of the children who receive a first dose of vaccine to return for the second, and for only one half of

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those to return for a third. Even when coverage with the first dose is high, few children benefit from full protection. These high drop-out rates are particularly devastating with respect to measles immunization. Measles immunization must be deferred until at least nine months of age, to avoid the vaccine being rendered impotent by antibodies passed on to the child from the mother's own body. This is often the age at which children are asked to return for their third dose of DPT (diphtheria-pertussis-tetanus) and poliomyelitis vaccines.

If children don't turn up for that third dose, they will probably not be immunized against measles at all. Yet almost all will contract the disease and, in the developing world, three out of every hundred measles victims will die. For malnourished children, the death rate from measles rises closer to 10%.

Reducing drop-out rates is therefore obviously fundamental to the question of protecting all children by immunization. But the task is not as simple as telling the mother when and where she must return. When the child is nine months old, he or she is at the awkward age of being 'too young to walk and too heavy to carry'. It is also an age when the 'newness' of both the baby and the idea of vaccination has worn off, so the mother may not receive as much support or encouragement from her husband or her community in seeking a preventive health service for a child who may seem, at the time, not to need it. Just as important, the mother may be expected to stay in the fields, especially in the planting or harvesting season, or to carry on working to earn income or to attend to other pressing family problems. Finally, it may be a long way to the health centre or clinic for an overworked and exhausted mother with a heavy baby. And so the immunization date goes by.

To overcome such problems requires a whole range of developments from more accessible health services to more labour-saving technology (and more equity) for women. But as far as health workers and immunization organisers are concerned, it means that all members of the community, as well as all mothers, should understand the importance of the pattern of immunizations and

be involved in planning the times and places when immunization will be offered.

This partnership between health worker and community is important for all aspects of health care. If it can be successfully built around services such as oral rehydration therapy or immunization – when the beneficial results can be quickly recognised – then the partnership may be developed into more difficult areas such as the improvement of nutrition, hygiene or child spacing.

None of these problems – and they are the major problems facing EPI – will be solved by technology. But where human and organisational problems are still a long way from being solved, certain technological advances, especially when related to problems encountered in the field rather than in the laboratory, could help to reduce the demands on scarce management skills and on limited money and time. To that end, EPI has made a major investment in the development of 'cold chains' – the unbroken relay of transport and storage which must maintain vaccines at the right temperatures from the point of manufacture to the point of use.

This year, for example, 50 countries are testing a new vaccine monitoring card which is attached to each package of 5,000 doses of measles, polio, DPT or BCG (tuberculosis) vaccine. If the cold chain is broken at any stage in the vaccine's journey, chemical colour-changes on the monitoring card warn health workers that the vaccine has become impotent. For measles, a new kind of monitor, attached to the individual vaccine container, is also undergoing field trials in ten countries. Again, if the cold chain is broken at any point, a red disc on the lid of the container will turn to black.

To prevent cold chains from being broken, several new developments are now in the offing. In many countries, over 50% of the refrigerators used to store vaccines are not working because of lack of maintenance and shortage of spare parts. To help bridge these potential breaks in the cold chain, a new 'universal spare parts kit', capable of repairing most makes of refrigerator, has been developed by WHO, UNICEF and the Danish International Development Agency, and is now on field trial in ten countries. To tackle the same

problem, 23 countries have this year been testing eight different kinds of solar refrigerator, powered by photovoltaic cells. Although the practical application of solar energy technology to the cold chain is still several years distant, there is no doubt that it has great potential for improving immunization coverage by providing for vaccine storage in the many areas, especially in Africa, where no other energy source is available.

Yet another approach to the 'cold-chain' problem is the present research into new and more heat-stable vaccines. Since 1981, the new generation of measles vaccines – which can be stored in a normal health centre refrigerator rather than in a deep freezer and retain their potency up to seven days, even in temperatures of up to 37°C – has been widely available. Research to develop more heat-stable vaccines for oral polio immunization and whooping cough is being pursued.

Of immense practical value are the new syringes which are just now becoming available – constructed of high-temperature plastics and capable of withstanding up to 200 sterilizations at 132°C. Open boiling water will not, of course, reach this temperature and another useful idea now being tried out is an adapted domestic pressure cooker, fitted with racks inside for holding syringe barrels and needles, which will be able to sterilize equipment at higher than boiling temperatures.

Finally, on the technological front, improved forms of present vaccines, as well as vaccines against additional diseases, including malaria, are on the way. One expects that new developments will also provide the opportunity to reduce the number of doses required to protect children against the six current EPI diseases, and this would indeed be a stride forward in reducing management problems and drop-out rates.

These then are the main technological hopes for advancing EPI. But even these developments would not make any very significant impression on the central constraint – the spread of primary health care services, community involvement in immunization programmes and the development of management skills.

Finally, EPI world-wide faces a lack of ade-

quate finance. It is currently estimated that, all things taken into account, it costs about \$5 to fully immunize a child against the six target diseases. For the foreseeable future, 100 million children will need immunizing every year in the developing world. The amount required is therefore approximately \$500 million a year.

Currently, less than \$100 million a year is being invested in EPI. Eighty per cent of that sum comes from the developing countries themselves and 20% comes in aid from governments and international organizations like UNICEF, UNDP and WHO. Increases in that level of support from the international community are essential if progress towards immunizing all children is to be accelerated. Most of the external funds are spent on the hardware – on vaccines and cold-chain equipment which have to be imported and paid for in hard currency. Sufficient outside support is needed to match the increasing investments being made by developing countries in staff and training and local costs, otherwise the staff will have nothing to work with, and the developing countries' efforts wasted. Increasing the funds available is therefore an important challenge for the international community, for WHO and for UNICEF – which for many years has been the major single provider of vaccines and cold-chain equipment to the developing world.

To meet the challenge of the EPI will take commitment – by parents, by communities, by health workers, by governments of both developed and developing countries and by international aid organizations. Can this commitment be won – so that no child is killed or crippled or retarded by the lack of \$5 worth of immunization? Can the EPI still hope to achieve its target of making immunization available to all children in the short time remaining until 1990?

We have no choice but to try our best. For it is a sad indictment of the state of our planet's civilization when children are allowed to die in such numbers from simple things like whooping cough or measles or be crippled by preventable polio. In a truly civilized world, there could surely be few appeals as powerful to both heart and mind as the appeal to provide the protection of immunization for all children. We cannot be allowed to fail.

The Promotion of Breastfeeding

by Natividad
Relucio-Clavano

Natividad Relucio-Clavano is Chief of the Department of Paediatrics at the Baguio General Hospital and Medical Center, Baguio City, and National Programme Consultant, Under-Six Clinic, for the Philippine Ministry of Health. She began her career at Baguio General Hospital in 1961 as Resident Physician, becoming Senior Resident Physician, Medical Specialist I, and then Chief of Paediatrics in 1973. The Under-Six Clinic which she founded in 1975 has now been adopted as a national programme by the Ministry of Health, and has won her a national award.

In both developed and developing countries today, health workers and scientists are coming to recognise the immense health benefits which are being denied to countless infants whose main, if not sole, source of nutrition is powdered milk formula. They are denied these benefits because they are denied a rich source of protection and nutrition – breastmilk. In many different parts of the world, substantial evidence has established both the direct and indirect relationship of breastfeeding to lower rates of illness, death, and malnutrition among children.

First of all, breastmilk is a perfect infant food, providing babies with complete, balanced nutrition. It is also a fluid with living cells which are constantly changing and adapting to the immunological and nutritional needs of the baby. It has been found, for example, that the breastmilk for mothers of premature infants has a higher concentration of proteins and immunoglobulin A than the milk of mothers of full-term infants. This natural phenomenon is vital to the growth, protection, and survival of the premature infant, whose need for protein and immunological protection is greater.

A second natural miracle of breastfeeding is the 'homing mechanism' which enables mothers to produce and transmit to their babies, through breastmilk, antibodies against infections.

Breastmilk initially appears as colostrum, a concentrated yellowish fluid measuring approximately 25 ml during the first 24 hours. The small amount and strange colour of the milk at this stage misleads many health workers and mothers

into feeling anxious that the mother's own milk might not be enough to feed the baby. Because of this, many women resort to prelacteal or supplemental formula. The result is less suckling and therefore less breastmilk supply. In many cases, this process ends in breastfeeding being abandoned altogether.

In some cultures, colostrum is considered dirty and stagnant and is deliberately expressed and discarded. Some mothers discard only the first few drops of colostrum while others discard all the colostrum for three days. Meanwhile, the child is usually fed on sugar and water or on infant formula and is thereby deprived of the anti-infective cellular components in the colostrum which engulf and kill virus, bacteria, and fungi. Colostrum also contains proteins, 65% of which are anti-microbials. In the mature milk, these immunological qualities of colostrum are present in lesser concentrations. In addition, breastmilk has also been found to contain taurine in quantities 30 to 40 times greater than in infant formula. Taurine is essential to the development of brain cells.

A third advantage of breastfeeding is its contraceptive effect. The prolactin which is released into the mother's body by the act of suckling inhibits the return of ovulation and significantly reduces the likelihood of pregnancy. According to some estimates, more pregnancies are prevented by breastfeeding than by all other forms of contraception put together. So although lactation is not a reliable form of family planning from the individual mother's point of view, there is now no doubt that the overall effect on a society is to lengthen the interval between births, lower total family size, and reduce population growth.

Anything which interferes with the intensity, frequency and duration of the child's suckling may therefore diminish the many different kinds of protection which breastfeeding provides. And of all such threats, the greatest is the trend towards bottle-feeding with infant formulas.

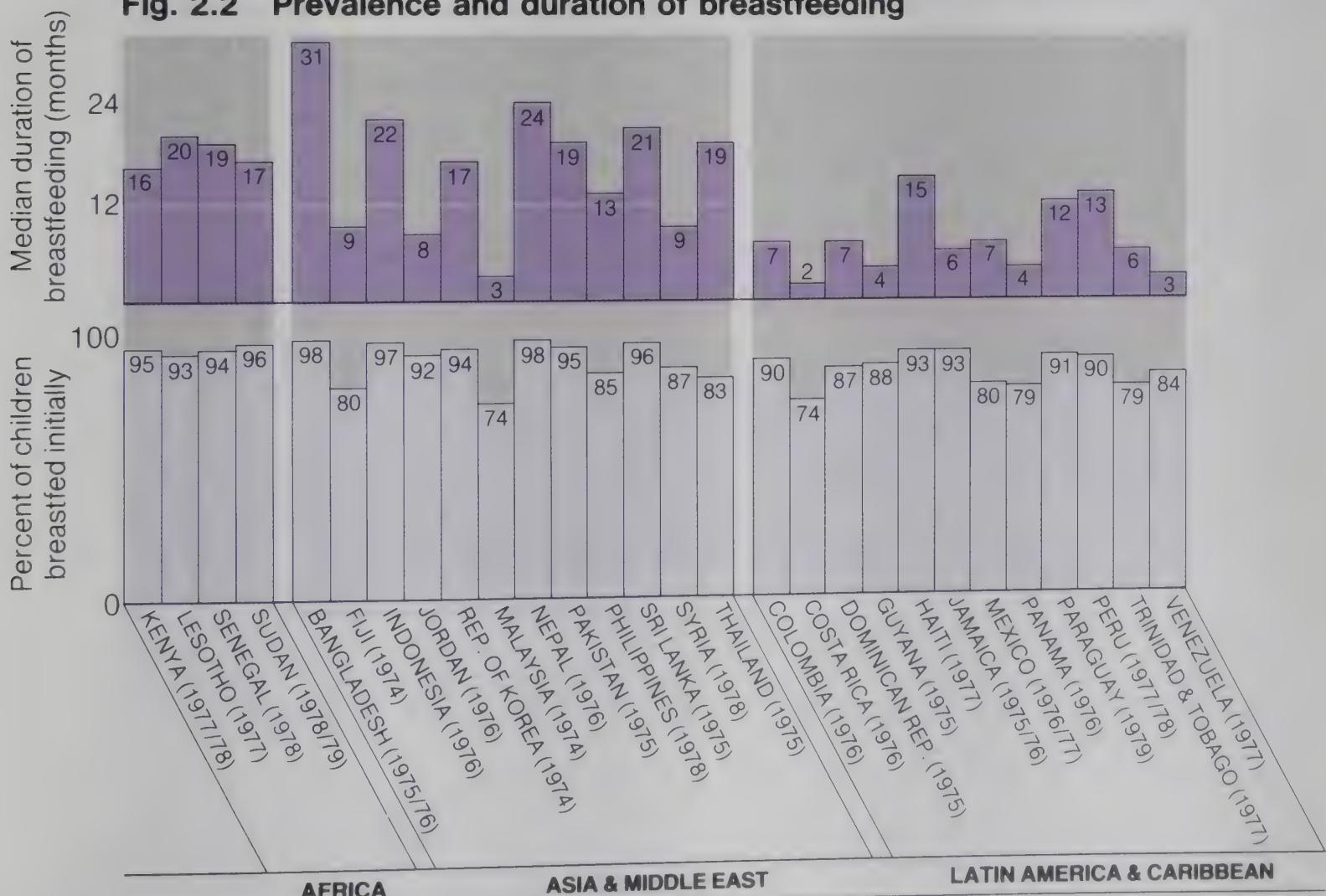
It is a threat which operates in two ways. In place of the nutritional and immunological protection of breastfeeding, bottle-feeding with artificial formula substitutes the risk of malnutrition from over-diluted milk powder and of infection

from unclean water and feeding equipment. Secondly, bottle-feeding has an indirect effect on child health through its contribution to shorter birth intervals and larger family size – both of which are known to be correlated with increased malnutrition, illness, and death among the world's infants.

In spite of the many attempts to fully understand the biological, nutritional, anti-allergic and other protective properties, as well as the psychological benefits which can be derived from breastfeeding, there are still more protective and nutritive qualities of breast milk which need to be discovered. It will probably take another decade to fully appreciate all the benefits of breastmilk – benefits which neither man nor machine can duplicate. Breastmilk itself is still an enigma.

Most of this research is relatively recent. But already, it has led to a large-scale return to breastfeeding in the industrialised nations, where this knowledge has been disseminated and where the proportion of mothers using commercial infant formula had previously risen to as high as 75% in some countries. Unfortunately, the earlier decline of breastfeeding in the developed nations has set an example which is still being followed in many other countries of the world. In traditional societies, breastfeeding was accepted as the only norm for the baby's survival. But as technology and 'modern' ways encroach on feeding methods and other habits, breastmilk is eventually abandoned in favour of bottle-feeding. In my own country, the Philippines, the trend away from breastfeeding has been very pronounced throughout the urban community. A WHO study, for

Fig. 2.2 Prevalence and duration of breastfeeding



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example, has shown that one third of mothers from economically advantaged backgrounds never even tried to initiate breastfeeding, while in the urban poor community one sixth of the mothers interviewed indicated that they had never breastfed. Furthermore, 27% of the mothers from the urban economically advantaged group, 9% of those from the urban poor, and 41% of those from the rural population were found to have been given free milk samples while in the hospital.

In the developing world, of course, the consequences of this trend towards bottle-feeding are very much more severe than in the industrialised world. To be used safely, commercial infant formula calls for access to pure water supply, means of sterilisation and refrigeration; for literacy, to be able to read and understand instructions; and for sufficient income to buy adequate amounts of the product. For many people in the developing world, however, the hygienic conditions necessary for the proper use of infant formula just do not exist. Their water is unclean, the bottles are dirty, the formula is diluted to make a tin of powdered milk last longer than it should. What happens? The baby is fed a contaminated mixture and soon becomes ill with diarrhoea, which leads to dehydration, malnutrition, and very often death. Surely our children deserve a better start in life?

Lastly, the change towards bottle-feeding also has serious economic disadvantages for the developing world and its families. In the Philippines, for example, the average expenditure for milk alone accounts for 14% of the average family income per year. To this must be added the cost of bottles, nipples, caps, and fuel for boiling.

As a result of such trends, women are losing the art of managing a successful breastfeeding relationship with their babies. Breastfeeding becomes so unnatural that they find it difficult to cope with simple problems - pain or soreness of nipples, breast engorgement and sucking difficulties of babies. Some mothers have flat or protractile nipples. But these problems can be solved if mothers understand them and have the opportunity to learn how to cope. Like any other skill, breastfeeding has to be learnt. But for many women, it has become easier to give up breastfeeding than to persevere in it.

In part, the change from breast to bottle-feeding also reflects a change in women's lives. And in order to promote the advantages of breastfeeding, we have to look into womanhood itself. Is the woman working? Does her work allow her to breastfeed? Is breastfeeding just one of too many jobs she has to do? How can I, you, the family, community, the society, the country lessen the pressure on women's energy and time and responsibility so that they can relax and enjoy breastfeeding?

When a mother becomes fully aware of the advantages of breastfeeding, she will voluntarily shift her priorities if she can. She will find time to enjoy breastfeeding her baby, allowing the luxury of an intimate, loving relationship to be developed. She will come to know the true function of her breast, not as a symbol of sex, but for her child's survival. But one of the main reasons why so many women have abandoned breastfeeding is the example set by hospitals themselves. Another has been the promotion of artificial milk by many commercial companies - fortunately a now declining number - and especially the giving away of free samples of milk powder to new mothers in hospitals and health centres. In most hospitals in the Philippines, especially in the urban areas, new-born babies are separated from their mothers at birth, confined to nurseries, and initiated to the taste of powdered cow's milk several hours after birth - even before their mothers have a chance to breastfeed them. This is the way we bring children into the world.

If such policies in health units are allowed to persist, then we, the health workers, have become the tool of the offending companies in their vigorous marketing campaign.

Can we allow this to happen in our midst? Are we willing to counter these milk companies' multi-million dollar campaigns with all the effort we can muster to return babies back to their mothers' breast for survival and health?

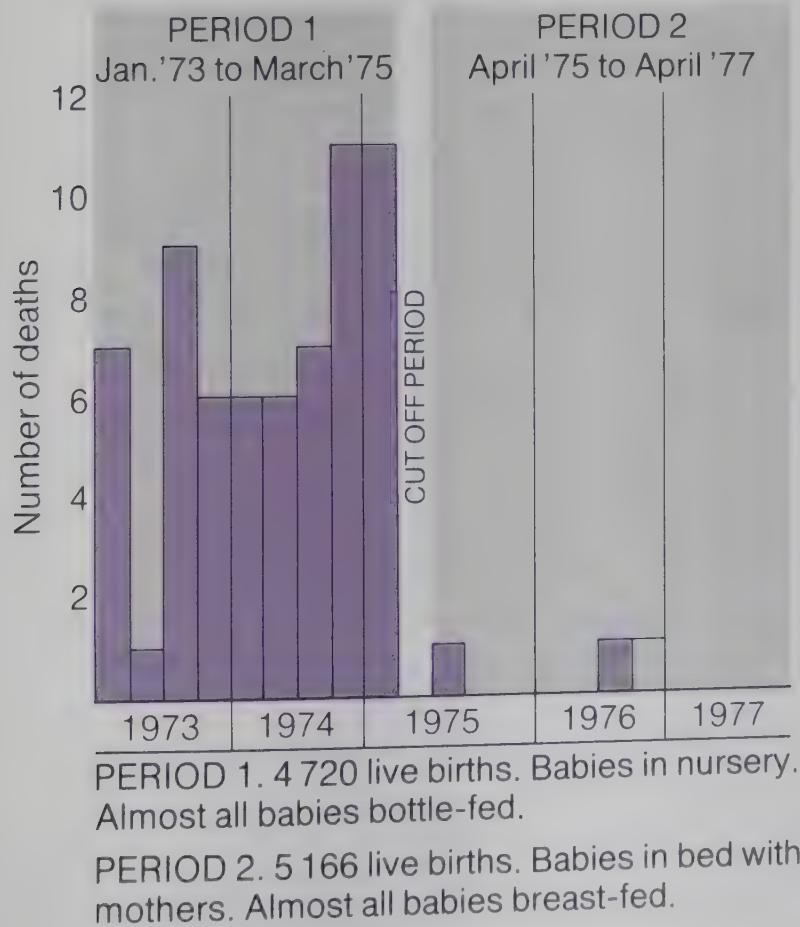
Fortunately, with the adoption of the Code on the Marketing of Breast Milk Substitutes by the World Health Assembly in 1981, many hospitals - and infant formula companies - are now beginning to change their methods.

Even so, the revolutionary task ahead of us can sometimes seem insurmountable. How many millions of mothers need to be reached, to be given adequate knowledge about, and convinced of the advantages of, breastfeeding? How do we reach them? To start with, how do we educate health workers about the superiority of breastmilk over infant formula, and motivate them to set an example by breastfeeding their own babies?

We cannot allow ourselves to be overwhelmed by these questions. Rather, let us accept them as a challenge to us all, as it was to those of us on the paediatric staff at my own hospital, Baguio General Hospital in the Philippines.*

*Baguio General Hospital and Medical Centre, now called the Dr. Efrain C. Montemayor Medical Centre, is an urban tertiary hospital located in the northern part of the Philippines. It has a 350-bed capacity. Its nursery has 60 bassinets and admits an average of 2,200–2,500 babies a year.

Fig. 2.3 Infant deaths, Baguio General Hospital, 1973–1977



Through a reshaping of policies, and of standard operating procedures in the nursery at the hospital, we have completely phased out milk formula and bottle-feeding. We have adopted, in its place, early rooming-in and breastfeeding, a manageable and affordable policy which allows the new-born infant to be within easy reach of its mother 24 hours a day.

This practice is encouraged not only immediately after the birth but also during the time when babies are sick and need to be hospitalised. Mothers are encouraged to stay with their sick babies in order not to disrupt lactation. Even infants in intensive care units are breastfed if possible, and looked after by their mothers. In this way, a mother feels contented, knowing that her child is safe and well-fed. In this way, she learns to care for her baby and to cope with problems under the supervision of the nursing and medical staff. No infant is separated from its mother without a valid reason.

In addition, the policy of rooming-in provides a sustained intimate contact between the mother and infant during the first few days after the birth. And there is now significant evidence to show that contact between mother and child immediately after delivery strengthens the mother-child bond, and increases the likelihood of prolonged breastfeeding.

This policy has produced results at Baguio which are no less than dramatic and which show the colossal potential of promoting breastfeeding, and combating the spread of infant formula in the developing world. Over a period of four years and four months (approximately the two years before the policy change and the two years after), the results were evaluated by comparing death rates and infection rates among almost 10,000 new-born children who had been fed by different methods – breast, formula and mixed. The results showed a dramatic and significant correlation between breastfeeding and decreased death and illness in infants. Sixty-four babies died during the first period when bottle-feeding was the predominant form of feeding. Only 3 died during the second period. This represented a drop of 95% in the incidence of death among the new-born. Of the 67 babies who died, 64 were bottle-fed, 2 were breast fed, and 1 was on mixed feeding. From 1975

The Code: Marketing breastmilk substitutes

Excerpts from: The International Code of Marketing of Breast-milk Substitutes, World Health Organization, Geneva, 1981

- The aim of this Code is to contribute to the provision of safe and adequate nutrition for infants, by the protection and promotion of breast-feeding, and by ensuring the proper use of breast-milk substitutes, when these are necessary, on the basis of adequate information and through appropriate marketing and distribution.
- The Code applies to the marketing, and practices related thereto, of the following products: breast-milk substitutes, including infant formula; other milk products, foods and beverages, including bottle-fed complementary foods, when marketed or otherwise represented to be suitable ... for use as a partial or total replacement of breast-milk; feeding bottles and teats...
- Governments should have the responsibility to ensure that objective and consistent information is provided on infant and young child feeding for use by families and those involved in the field of infant and young child nutrition...
- There should be no advertising or other form of promotion to the general public ...
- Manufacturers and distributors should not provide, directly or indirectly, to pregnant women, mothers or members of their families, samples ...
- ... there should be no point-of-sale advertising, giving of samples, or any other promotion device to induce sales directly to the consumer ...
- Manufacturers and distributors should not distribute to pregnant women or mothers of infants and young children any gifts of articles or utensils which may promote the use of breast-milk substitutes or bottle-feeding...
- The health authorities in Member States should take appropriate measures to encourage and protect breast-feeding and promote the principles of this Code ...
- No facility of a health care system should be used for promoting infant formula ...
- Feeding with infant formula ... should be demonstrated only by health workers, or other community workers if necessary; and only to the mothers or family members who need to use it ...
- Health workers should encourage and protect breast-feeding; and those who are concerned in particular with maternal and infant nutrition should make themselves familiar with their responsibilities under this Code ...
- Labels should be designed to provide the necessary information about the appropriate use of the product, and so as not to discourage breast-feeding...
- Governments should take action to give effect to the principles and aim of this Code, as appropriate to their social and legislative framework ...
- ... manufacturers and distributors of products within the scope of this Code should regard themselves as responsible for monitoring their marketing practices according to the principles and aim of this Code ...

until the present day, outbreaks of diarrhoea have been almost non-existent, cases and deaths due to clinical sepsis have been remarkably reduced, and the occurrence of oral thrush has been practically nil in our nursery (see Figures 2.3 and 2.4).

The first three years of the campaign were difficult and trying, but we have been able to accomplish our goal. We have been able to prove that milk formula and bottle-feeding is only a man-made deviation which can and should be dispensed with. We have no need for infant formula. We have breastfeeding mothers, wet-nurses, and a small milk bank in the nursery.

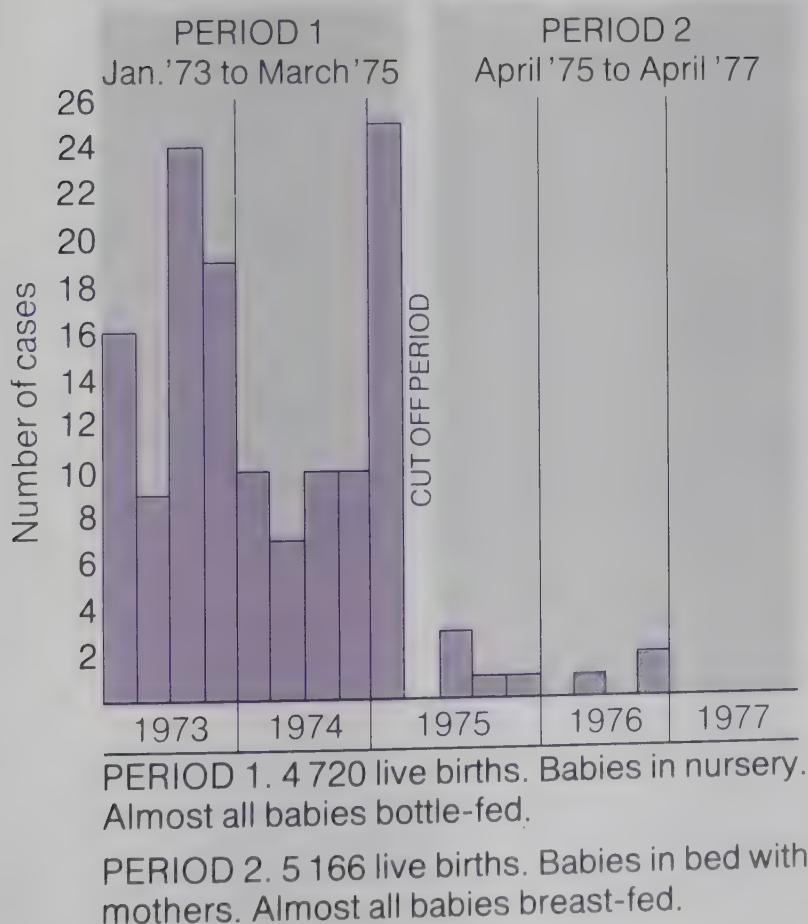
Our campaign has not yet ended, for it cannot be confined to our own hospital. The Under-Six Clinic programme which we developed at Baguio was adopted as a national programme in July 1979 by the Ministry of Health and has since been assisted financially by UNICEF. Now, the Baguio

Under-Six Clinic serves as a national training centre for health personnel from all over the country. Besides promoting breastfeeding by educating mothers about its advantages, the programme also includes: rooming-in within half an hour after birth; a mother-and-child room where mothers are encouraged to stay to breastfeed and care for infants who are ill; and an over-the-phone information and counselling service for mothers who encounter problems or worries in breastfeeding. Working mothers are given special attention by teaching them how to collect and store their own milk for their babies. Usually, hospital staff are able to teach breastfeeding competently because they have also breastfed their own babies.

Although the pioneering programme at Baguio has made headway in reducing deaths and infections among infants, there is still a long way to go before its hospital practices are adopted by health institutions throughout the Philippines. During the next five years (1983-1987) a concerted effort headed by the Ministry of Health with the assistance of UNICEF will try to promote breastfeeding throughout the country. It is a programme which includes: the adoption and enforcement of the International Code of Marketing of Breast-milk Substitutes; changes in hospital routines and standard practices; motivation and information campaigns addressed to decision makers, health professionals, mothers, and the community at large; the development of health training syllabuses which include the advantages of breastfeeding; legislation to protect a mother's right to breastfeed; and the active participation of the information media.

Internationally the campaign to reverse the decline of breastfeeding is an even more tremendous challenge. Much has been written on the strategies and techniques for the promotion of breastfeeding. But although attempts are being made to pursue such programmes, many countries are starting from square one - surrounded by much confusion and guided by very little experience. What happens to those countries who need help in designing the right policies, laws, curricula, hospital routines, commercial guidelines, and promotion strategies? What can be done to help them promote breastfeeding? Surely what is

Fig. 2.4 Incidence of diarrhoea, Baguio General Hospital, 1973-1977



now required is a strong global strategy to inspire an international network of advocate groups for breastfeeding. Such an international task force could be called upon to play a role in the promotion of breastfeeding from country to coun-

try and to extend and share their expertise in promoting and monitoring breastfeeding in all nations of the world. At stake are the lives and health of many millions of children. Let us give all our children what they deserve: the best.

Family Spacing

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Family planning is often seen as the equivalent of population control and both are usually thought of as a response to the 'population explosion'. But even if there were no such thing as a world population problem, there would still be an urgent and compelling case for family planning.

The spacing, timing and number of births a woman has are important to both her health and that of her children. Science has only recently been able to document the validity of this simple statement, although people the world over have long accepted its truth. When 21,000 women in five developing countries were interviewed in a WHO survey, for example, nine out of ten said that the health of the mother and of her children

by Joe Wray
and Deborah Maine

is better if the family is small and if children are born at least three years apart.⁽¹⁾

In this article, we present evidence of the profound effects of family spacing on maternal and child health in both industrialized and developing countries. In our view this health effect is one of the most important reasons for making modern methods of family planning available to all who wish to use them. Another reason is that people have a right to control basic aspects of their lives, and few things could be as fundamental as the control by women of the timing and number of their children. Ten years ago, this right to the knowledge and the means of family planning was affirmed at the World Population Conference in Bucharest. But as data from the World Fertility Survey show, that right exists only in theory for millions of the world's women because they know of no place to obtain family planning advice and supplies.^(2, 3)

One of the reasons why science sometimes appears slow in establishing basic facts about health in the developing world is that it is often very difficult, if not impossible, to gather the necessary data. Furthermore, since the number of deaths is easier to measure than the 'degree of health', we have much more information on the relationship of family formation patterns to maternal and child deaths than to maternal and child health. Consequently, while much of the evidence which follows focuses on child mortality, it is essential to remember that for every child who dies as a result of health problems associated with birth spacing and family size, there are many more who are sickened, weakened, or handicapped. The

same is true for every woman who dies of an illegal abortion or of haemorrhage or infection after childbirth itself.

Perhaps the most important factor in the relationship between family formation patterns and child health is the length of the interval between births. In many cultures, people have long known that having children too close together is dangerous for health. 'Kwashiorkor', for example, is an African word for the malnutrition of a child weaned too early from the breast because the mother is pregnant again.⁽⁴⁾ In recent

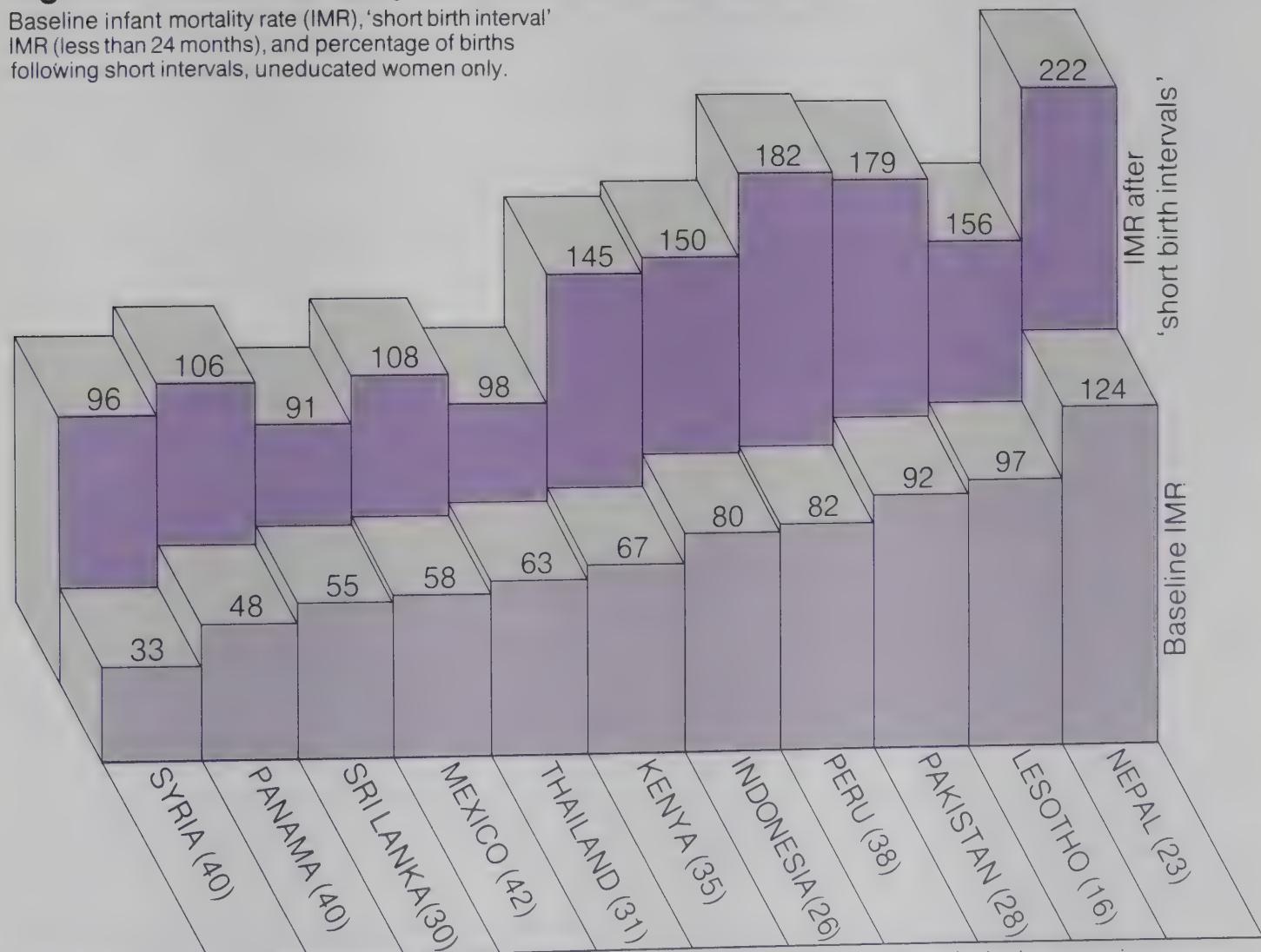
years, scientific evidence from the World Fertility Survey has shown clearly that:—

- The relationship between birth intervals and child health and survival is not a local or transient phenomenon. In every one of the 26 countries so far studied, there was an increase in infant deaths if the previous birth interval was less than two years.⁽⁵⁾

- This increase in infant mortality is substantial. In only one of the 26 countries was it less than 50%; in the majority it was over 100%. Figure 2.5

Fig. 2.5 Infant mortality and intervals between births

Baseline infant mortality rate (IMR), 'short birth interval' IMR (less than 24 months), and percentage of births following short intervals, uneducated women only.



Note: The baseline IMR is the IMR among babies born more than two years after the birth of a previous child. The 'short birth interval' IMR is the IMR among babies born less than two years after a previous birth. Both sets of

figures are for women who have had only one previous birth in the last six years.

Figures in parentheses indicate the percentage of 'short interval' births.

Source: World Fertility Survey data, 1970's

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presents a sample of the countries studied, and shows the excess mortality among infants born after short birth intervals.

○ Too short an interval between births not only raises an infant's chances of dying during its first year, it adversely affects the child's survival chances for at least the first five years of life.^(5,6)

○ Short birth intervals endanger the health of the older child of the closely spaced pair as well as that of the younger. Competition for breastmilk and parental care may well be important factors in explaining this finding. Often, the death of one child will hasten the birth of the next (either because of the parents' eagerness to 'replace' the lost child or because of the loss of the protection against pregnancy which breastfeeding provides). But such cases – cases in which a short interval between births may be a consequence rather than a cause of a child death – do not explain the strong link between birth interval and survival rates: even where the older child survives until the younger is born, its chances of dying are increased if the birth interval is short.⁽⁷⁾

○ While socio-economic conditions certainly influence child mortality, they are not responsible for the association between short birth intervals and increased mortality. The increase in risk is present regardless of mothers' and fathers' education, season of birth, region of residence, or presence of piped water.^(5, 8)

This last point is very important. While numerous studies have demonstrated that short birth intervals are associated with increased infant and child mortality, it has usually not been possible to tell whether this association was due to some other related factor such as socio-economic status or maternal education. If that were the case, of course, then the risk associated with short intervals would really be just one more manifestation of poverty. But analysis of World Fertility Survey data shows that this is not the case. While infants born into families with uneducated parents (a common measure of socio-economic status), into homes with no piped water, in slum areas, or in seasons of high mortality, do have higher mortality rates than infants born into more fortunate circumstances, the higher risks associated with

short intervals are similar for both.

This does not explain exactly why closely spaced infants are more likely to die, but it does tell us that the increase is not simply the effect of other well-known risk factors such as poverty and illiteracy.

Unfortunately, short birth intervals are not a rare event, as Figure 2.5 shows. In two thirds of the 26 countries studied, more than 30% of all births followed an interval of less than two years.⁽⁵⁾ In eight of the countries (all in Asia and Latin America) more than 40% of births followed an interval of less than two years. In no country was the proportion less than 15%. In three of the four countries where less than 20% of births followed short intervals (Senegal, Lesotho and Ghana), traditional birth-spacing practices (sexual abstinence and breastfeeding) are still relatively common. The fourth country is the Republic of Korea, which has had an active family planning programme for many years.

Even in countries where only 15–20% of births follow a short interval, the effects of better spacing on infant mortality would be substantial, as we will demonstrate later. However, there are other features which make birth spacing a particularly attractive primary health care initiative.

○ First, *spacing* births is a familiar concept in many traditional societies. While surprisingly large proportions of women say that they want no more children, in some parts of the world (especially in Africa) deliberate family size limitation is often considered an alien and unappealing idea.

○ Second, birth spacing is a concept which corresponds to the way people live, dealing with the present and the near future. How many of us really know, when we are 20 years old, how many children we will want or at what age we will wish to stop childbearing? *Postponing* the next birth for an extra year, however, is a reasonable goal.

○ Third, birth spacing can be accomplished in a number of ways. For most women, the use of a modern means of family planning is probably the most practical but prolonged breastfeeding and periodic abstinence are useful as well.

Unfortunately, traditional methods of birth spacing are less effective than are modern ones. Breastfeeding helps to prevent pregnancy as well as being crucial to infant health and development (especially in poor countries). But it is not a reliable method of contraception from the individual's point of view as a sizeable proportion of breastfeeding women can become pregnant again within the first year. This is particularly true of women who feed their babies other foods (as indeed they should after about six months, because breastmilk alone is no longer sufficient to sustain normal growth). A period of sexual abstinence following the birth of a child is, by definition, an effective way of spacing births. Most common in Africa, this age-old method is now becoming increasingly rare because of recent cultural changes. As polygamy decreases and more modern ideas are introduced, for example, long periods of sexual abstinence are becoming less acceptable to both men and women.

The evidence of a relationship between birth interval and child survival is thus strong and growing. In addition, a great many studies in both

the developed and developing countries have shown that the *total number* of children in the family also significantly affects child survival and child health.^(9, 11)

The true importance of this finding is that it coincides with the desires of many women. World Fertility Survey data disprove the common assumption that poor, uneducated women in developing countries generally want as many children as they can have or 'as many as God sends'. While it is true that only a small proportion of African women express a desire to limit the size of their families, an astounding number of women in other parts of the world are willing to tell a stranger holding an interview form and a pencil that they do not want any more children. For example, among women with three living children the proportions who said that they want no more children were 24% in Jordan; 39% in Nepal; 50–60% in Costa Rica and Mexico; and 60–70% in Bangladesh and Thailand.⁽¹²⁾

Figure 1.19 (page 57) shows how infant mortality increases with birth order in two very different parts of the world – El Salvador, and England and Wales.^(9, 13) While rates of infant mortality in England and Wales are only a fraction of those in El Salvador (and most other developing countries) the pattern is quite similar in both and stable over time. Again we do not understand all the reasons for this pattern. But we do know that the proportion of births which result in low-birth-weight infants increases after the second or third birth.^(14, 15) Low-birth-weight infants (weighing 2,500 grams or less at birth) are both more likely to die during the first year and to have more health problems than do other children if they survive.⁽¹⁶⁾ In poor families, some of the effect of higher birth order certainly comes from inadequate nutrition. A study in Colombia, for example, found that the more children there were in the family, the larger the portion of the family resources that was spent on food, but the smaller the amount of food available for each person, and the higher the proportion of the children diagnosed as malnourished.⁽¹⁷⁾

In addition to the birth interval and birth order, a third family formation factor influences child health and survival – maternal age at birth. And

Fig. 2.6 Percentage of infant deaths avoidable by birth-spacing

Percentage of infant deaths which would be averted if all births were spaced at least 24 months apart.



again, the effect is not confined to the developing countries, as data from China and Britain, shown in Figure 2.7^(13, 18) demonstrate. While the level of infant mortality in Britain has dropped sharply during this century, the relationship between maternal mortality and maternal age has not disappeared.⁽¹⁹⁾ Furthermore, in-depth studies in the United Kingdom have found that the effects of birth order and maternal age are apparent in every social class, although environmental factors are obviously important.⁽¹⁹⁾ In the United States, for example, teenaged mothers are often poorer, less educated and have less social support and access to medical care than older mothers.⁽²⁰⁾

Part of the increase in mortality among infants born to older women is the result of congenital malformations. Data from the United States demonstrate that the proportion of infants born malformed increases drastically among women older than 30.⁽²¹⁾ Some of these birth defects result in an infant death, while others produce lifelong disability. The rate of Down's syndrome (a severe and chronic mental and physical disability) rises exponentially with maternal age after 30.⁽²²⁾

From a public health viewpoint, maternal age as a risk factor for infant health has one outstanding characteristic (as does birth order): many women in their 30s and 40s do not want any more children. Their desires are precisely in accord with rational public health policy – they don't need to be 'sold' the idea. In general, the proportions of women who say they want no more children are similar among women aged 30–34 to those among women with three living children (cited above).⁽¹²⁾ In fact, the proportions are often higher, since many women have more than three children by the time they are 30 years old.

Much of what we know about the impact on children of spacing, timing and number of births is based on the associations with mortality described above. We also know, however, that mortality is only the tip of the iceberg. Excess deaths among children born into large families, or among children born too close together, or among children born to teenage mothers, are a clear indicator that infection and illness are also more common in these groups. While satisfactory data about the relationship between family formation patterns and the health of surviving children are

more difficult to obtain, the evidence which is available is persuasive.

One of the earliest long-term studies of illness in families showed, for example, that the number of episodes of diarrhoea per person increases with family size.⁽²³⁾ More recently, studies in developing countries have shown a clear-cut association between family size and malnutrition, manifested by stunting of growth.⁽¹⁷⁾ The WHO study of family formation found this pattern in four of the five countries studied.⁽¹⁾

Some of the most impressive data on this subject were obtained in the National Survey of Health and Development, carried out in Great Britain by Douglas and his co-workers.^(24–26) This study showed that children from larger families were shorter than their peers from small families by the time they were four and a half years old. The difference persisted at ages seven, eleven and fifteen. This persistence into young adulthood was amply confirmed by the study of 19-year-old males in the Netherlands, which showed a clear-cut decrease in height with increasing family size.⁽²⁷⁾

One of the interesting findings of the British study was that there was little or no effect of family size on growth in the upper middle class. On the other hand, children from one-child families in the lowest social group grew as well as those from upper-class families. This confirms what common sense would suggest: where food is abundant (as in prosperous families) family size is not important to nutrition; where food is limited, children grow much better if there aren't too many of them.

The question of family size and mental development is inevitably tinged with controversy. However, as long as we recognise that performance in intelligence tests is strongly influenced by culture and environment, test results are useful because they do reflect a child's ability to perform in school – and performance *can* be improved.

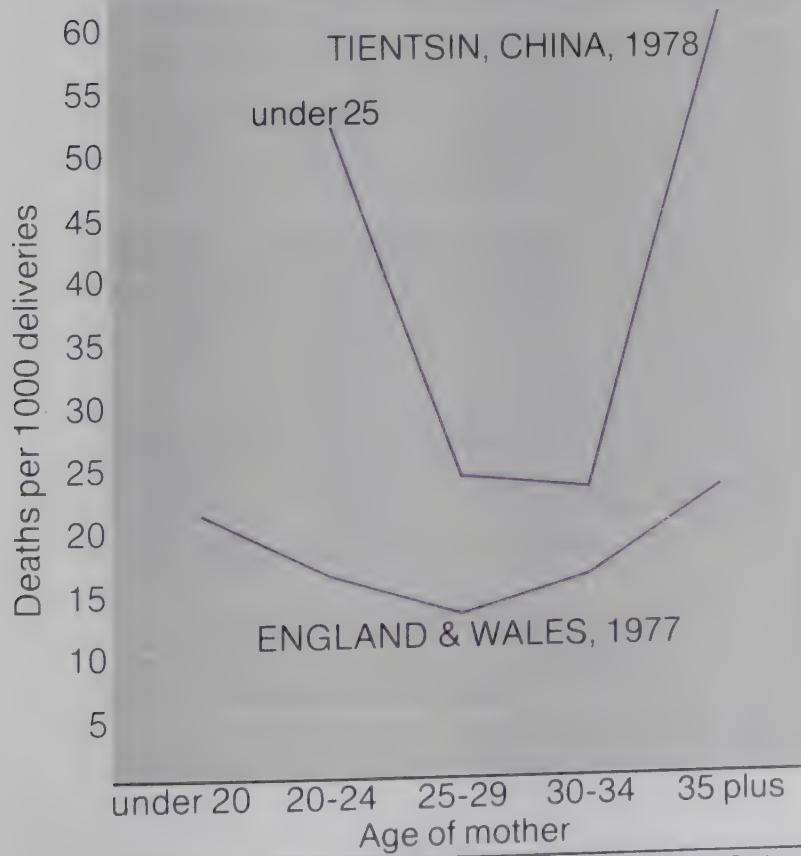
Repeatedly, studies of huge populations in Europe and the United States have shown that the larger the number of siblings, the lower the 'IQ' test score, regardless of the test used. The data are incontrovertible: a child from a large family is more likely to have a low IQ than is a child from a

small family.⁽²⁸⁾ (However, it is important to exercise care in applying this or any other generalisation to *individuals*. Just because a particular child is from a large family does not mean that he or she will automatically be intellectually less able than children from smaller families.)

The study of Dutch 19-year-olds (carried out in the late 1960s) provides detailed data on almost 400,000 young men.⁽²⁸⁾ This large population allowed a level of refinement of analysis that had not been possible in earlier studies. The negative relationship of intelligence to family size (unlike the association with growth) was found in *all* social classes. Whatever the factors associated with family size that reduce a person's 'IQ', they seem to operate regardless of social classes. Furthermore, not all children in large families are affected equally: among families of a given size, test scores fell with each increase in birth order.⁽²⁷⁾

Fig. 2.7 Deaths by age of mother

Foetal deaths during the last two months of pregnancy and deaths during first week after birth – by age of mother.



Source: K. C. Lyle, S. J. Segal, C. Chang and L. Ch'ien, "Perinatal Study in Tientsin: 1978," *Int. J. of Gynaecology and Obstetrics*, 18(4): 280–89, 1980

How do family size and birth order affect intelligence? The exact mechanisms may never be known. One of the most likely explanations is that the intellectual development of a child depends to an important degree on a nurturing environment and the amount of stimulation received from the parents (especially the mother) early in life, and parents with too many children cannot provide the stimulation needed for optimum development. This explanation is also consistent with the changes associated with birth order – with each succeeding child, the mother has a little less time and energy. It is also confirmed by the observation that youngest children in a family do well if born after an interval of five or more years. Presumably this is because as the other children grow older they demand less of the parents' attention and, being more mature, can even help teach their younger sibling.⁽²⁷⁾ Thus, birth interval may be a key factor in intellectual as well as physical development.

So far, the focus of this report has been the impact of family formation patterns on the mental and physical development of children. But it is important to point out that family planning has a beneficial effect on the health of women as well.

Having a large number of children, or having births at unfavourable ages, increases the likelihood that a woman will die during pregnancy or delivery. Again, these relationships are 'J-shaped' (high among the youngest women, still higher among the oldest), and they are found in countries with low rates of maternal mortality (such as the United States and Britain) as well as in developing countries where maternal deaths are still relatively common.⁽¹⁰⁾ The persistence of this relationship has been shown in Sri Lanka where maternal mortality declined substantially between 1956 and 1968⁽²⁹⁾ but where the pattern of deaths by maternal age remained. (In fact, the *relative* risk associated with advancing maternal age may be greater in industrialised than in developing countries.⁽¹⁰⁾)

Probably the greatest contribution which family planning can make to women's health is through a reduction in the number of illegal abortions. Precisely because they are illegal, such abortions are not well documented. Even so, the

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evidence is ample that millions of women are forced to risk their health and lives if they wish to avoid unwanted births. This is a reflection of their desperate determination to plan their families.

It is estimated that more than one half of the women in the world now live where access to abortion is restricted to some extent by law.⁽³⁰⁾ More than one fifth of women, for example, live in countries where abortion is illegal except to save the woman's life. In many of these same countries it is estimated that there are more than 200 abortions for every 1,000 live births.⁽³⁰⁾ Even more troubling is evidence that illegal abortion is becoming more, rather than less common, especially in Africa.⁽³¹⁾

That this situation causes needless pain and death among women is obvious – most of these abortions are performed by untrained personnel, or by the woman herself, and often under grossly unsanitary conditions (except among the wealthy in the cities). It is estimated, for example, that more than 68,000 women in developing countries died from illegal abortions in 1977 alone.⁽³²⁾ Furthermore, the care of women who require medical treatment after an illegal abortion represents a serious drain on scarce medical resources in developing countries.^(33, 34)

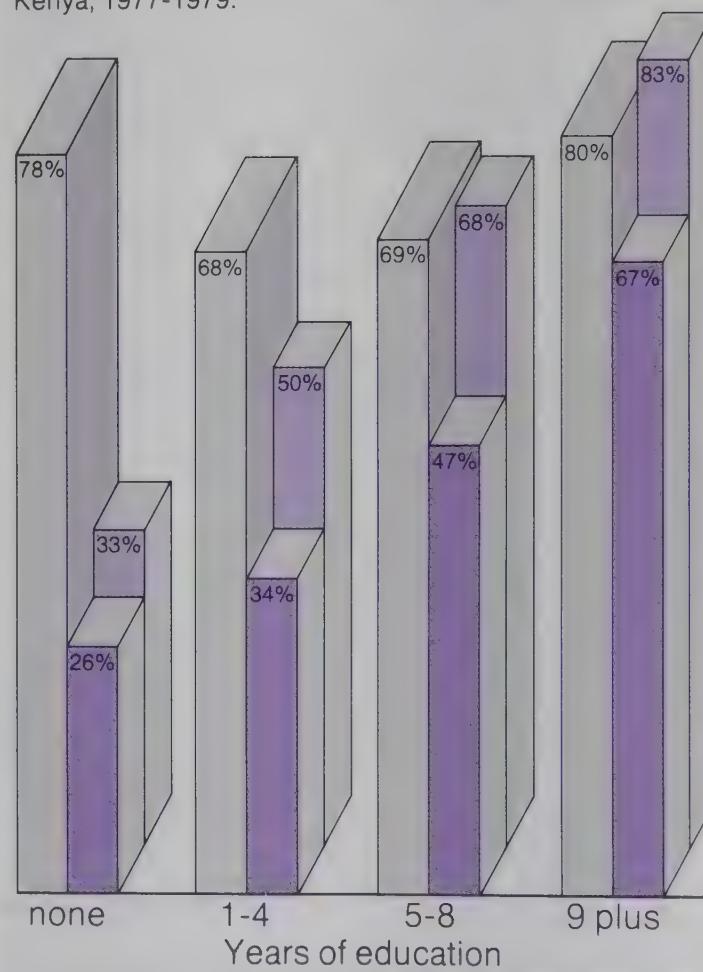
Such deaths are unnecessary. Studies conducted over the past two decades have shown that use of modern methods of family planning is safer than pregnancy (except among women older than 30 who smoke cigarettes) and certainly far safer than illegal abortion.^(35, 36) While more and better studies need to be undertaken in developing countries, it is expected that since maternal and abortion mortality rates are highest in the Third World the effects of family planning in reducing those rates will be even more pronounced.

Improvements in maternal and child health as a result of family planning have already been documented in developed countries, and the few data available indicate that improvements occur in developing countries as well. In Chile between 1964 and 1978, for example, the proportion of women aged 15–44 who obtained help from family planning programmes increased from only 3% to more than 25%.⁽³⁷⁾ At the same time, the birth rate fell from 36 births to 22 births per 1,000

population. Most of the reduction in childbearing was among the high risk groups – teenagers and women over age 30. During this same period, infant deaths in Chile declined from more than 100 to 35 deaths per 1,000 live births.⁽³⁷⁾ Maternal deaths due to illegal abortion dropped from more than 115 to fewer than 25 deaths per 100,000 live births. Hospitalisations for complications following illegal abortions also declined sharply.

Fig. 2.8 Family planning: access and use

Percentage of women aged 25–34 who have ever heard of a place to obtain contraceptive advice or supplies, and who have used a method of contraception, by years of education, Kenya, 1977–1979.



Key

- [Light grey square] Have heard of a place to obtain contraceptive advice or supplies.
- [Medium grey square] Have used a method of contraception.
- [Dark grey square] Women who have used contraceptives as a proportion of those who have access to them – by education.

Note: Excludes never married women.

Source: Central Bureau of Statistics, Ministry of Economic Planning and Development, Kenya Fertility Survey, 1977–78, First Report Volume 1, Nairobi, 1980.

Certainly, family planning is not the only factor which affects infant or maternal health. In the Chilean example, there were other factors at work during this period. Nevertheless, the contribution which family planning can make is large. In the United States, it is estimated that fully one half of the sizeable decline in infant mortality during the 1960s was due to more favourable childbearing patterns (fewer births among women older than 30 and fewer births of children of birth order four or higher).⁽³⁸⁾

Using World Fertility Survey data, it is now possible to roughly estimate the impact that family planning could have in developing countries. Figure 2.6 shows the proportions of infant deaths which would be averted if all births were spaced at least 24 months apart (based on the data presented in Figure 2.5). In most of the countries shown, the proportion of deaths which would be avoided by better spacing is between 15 and 50%. Few public health measures can offer such a dramatic reduction in mortality (and related improvements in health) in so short a time.

Furthermore, if all women who said that they wish not to have any more children implemented their wish, this would have an additional and substantial effect in preventing infant deaths, since the proportion of women who want no more children increases with age and family size, placing the children of such mothers also at greater risk.

Many factors determine whether a couple will decide to plan the number, spacing and timing of their children, but experience with family planning programmes all over the world has highlighted one important fact: easy access to family planning services and supplies, in itself, encourages and increases their use.⁽³⁹⁾ Yet there are still many countries where such access is limited. To use a crude but telling measure, World Fertility Survey studies have revealed that the proportion of married women who do not know of any place where they can obtain contraceptive supplies or advice is 20–30% in Malaysia and Panama; 30–40% in Colombia; 40–50% in Indonesia and Mexico; 50–60% in Kenya, and over 90% in Nepal.⁽⁴⁰⁾

The importance of increasing knowledge of and access to family planning services is demonstrated by Figure 2.8. It is a truism that attitudes toward family planning in Africa are different from those in Asia and Latin America – the implication being that even if family planning services were widely available, African women would not make use of them. And it is indeed true that use of family planning is increasing more slowly in Africa than it did in other parts of the world. Nevertheless, Figure 2.8 shows that in Kenya the proportion of women who have ever used contraceptives varies directly with the proportion who know where family planning services can be obtained.⁽⁴¹⁾ Women with little or no education in Kenya are less likely than other women to know where to obtain family planning services, but if they *do* know, then they are just as likely to use those services as are women with much more education. Without these data, one might look at the rates of contraceptive use and conclude that traditional, uneducated Kenyan women are not interested in family planning. This would be a mistake. Furthermore, the same relationship between knowledge of a source of supplies and advice and use of them held true when women were divided according to urban or rural residence, or their religion (Catholic, Protestant, Muslim). In all cases the majority of women in Kenya who knew where to obtain family planning advice and supplies had used them at some time.

In summary, children need healthy, nurturing mothers (and fathers, too) and society needs healthy, vigorous children. Making it possible for parents to space births properly, to keep family size within desired limits, and to avoid pregnancies too early or too late in life contributes to the well-being and the survival of women and children. Evidence from all over the world suggests that many parents *know this* – that they are, in this respect, well ahead of many policy-makers, planners, and health service providers. There is a demonstrable *need* and a large *demand* for family planning and birth spacing services. The methods are effective, safe, simple, and relatively inexpensive. Neither high-technology facilities nor expensively trained personnel are required to provide them. The policy implications could not be clearer.

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References

1. A. R. Omran and C. C. Standley, eds., *Family Formation Patterns and Health: An International Collaborative Study in India, Iran, Lebanon, Philippines and Turkey*, World Health Organization, Geneva, 1976.
2. Department of Economic and Social Affairs, *The Population Debate: Dimensions and Perspectives. Papers of the World Population Conference, Bucharest, 1974, Volume 1*, United Nations, New York, 1975.
3. M. Kendall, "The World Fertility Survey: Current Status and Findings", *Population Reports*, Series M, No. 3 M73-M104, 1979.
4. C. D. Williams, "Child Health in the Gold Coast", *The Lancet*, I: 97-102, 1938.
5. J. Hobcraft, J. McDonald and S. Rutstein, "Child-Spacing Effects on Infant and Early Child Mortality", paper prepared for the annual meeting of the Population Association of America, Pittsburgh, 14-16 April, 1983.
6. B. Edmonston, "Demographic and Maternal Correlates of Infant and Child Mortality in Bangladesh", *Journal of Biosocial Science*, 15: 183-192, 1983.
7. J. Cleland, "New WFS Findings Prove Spacing Benefits", *People*, 10: 16-17, 1983.
8. R. McNamara, analyses for doctoral dissertation, Columbia School of Public Health, unpublished, 1983.
9. R. R. Puffer and C. V. Serrano, *Birthweight, Maternal Age, and Birth Order: Three Important Determinants of Infant Mortality*, Scientific Publication No. 294, Pan American Health Organization, Washington, D.C., 1975.
10. D. Nortman, "Parental Age as a Factor in Pregnancy Outcomes", *Reports on Population/Family Planning*, No. 16, 1974.
11. J. D. Wray, "Population Pressure on Families: Family Size and Child Spacing", *Reports on Population/Family Planning*, No. 9, 1971.
12. D. Maine, *Family Planning: Its Impact on the Health of Women and Children*, The Center for Population and Family Health, Columbia University, New York, 1981.
13. A. M. Adelstein, I. M. M. Davies and J. A. C. Weatherall, *Perinatal and Infant Mortality: Social and Biological Factors 1975-77*, Studies on Medical and Population Subjects No. 41, Her Majesty's Stationery Office, London, 1980.
14. S. Selvin and J. Garfinkel, "The Relationship of Parental Age and Birth Order with the Percentage of Low Birth-Weight Infants", *Human Biology*, 44(3): 501-510, 1972.
15. R. Chakraborty, M. Roy and S. R. Das, "Proportion of Low-Birth-Weight Infants in an Indian Population and its Relationship with Maternal Age and Parity", *Human Heredity*, 25: 73-79, 1975.
16. H. Mahler, "Maternal and Child Health: Report by the Director-General", paper presented at the 32nd World Health Assembly, World Health Organization, Geneva, April 3, 1979.
17. J. D. Wray and A. Aguirre, "Protein-Calorie Malnutrition in Candelaria, Colombia. I. Prevalence: Social and Demographic Causal Factors", *Journal of Tropical Pediatrics*, 15: 76-98, 1969.
18. K. C. Lyle, S. J. Segal, C. Chang and L. Ch'i'en, "Perinatal Study in Tientsin: 1978", *International Journal of Gynaecology and Obstetrics*, 18(4): 280-289, 1980.
19. J. A. Heady, G. F. Stevens, C. Daly and J. N. Morris, "Social and Biological Factors in Infant Mortality: IV. The Independent Effects of Social Class, Region, the Mother's Age and her Parity", *The Lancet*, I: 499-503, 1955.
20. *Teenage Pregnancy: The Problem that Hasn't Gone Away*, Alan Guttmacher Institute, New York, 1981.
21. Public Health Service, "Congenital Anomalies and Birth Injuries Among Live Births, United States, 1973-74", *National Vital Statistics System*, Series 21, No. 31, National Center for Health Statistics, Hyattsville, Md, 1978.
22. S. Hay and H. Barbano, "Independent Effects of Maternal Age and Birth Order on the Incidence of Selected Congenital Malformations", *Teratology*, 6: 271-280, 1972.
23. J. H. Dingle, G. F. Badger and W. S. Jordan, *Illness in the Home: Study of 25,000 Illnesses in a Group of Cleveland Families*, Western Reserve University, Cleveland, 1964.
24. J. W. B. Douglas and J. M. Blomfield, *Children Under Five*, Allen and Unwin, London, 1958.
25. J. W. B. Douglas, *The Home and the School*, MacGibbon and Kee, London, 1964.
26. J. W. B. Douglas, J. M. Ross and H. R. Simpson, *All Our Future*, Peter Davies, London, 1968.
27. R. B. Zajonc, "Family Configuration and Intelligence", *Science*, 192: 227-235, 1976.
28. L. Belmont and F. A. Marolla, "Birth Order, Family Size, and Intelligence", *Science*, 182: 1096-1101, 1973.
29. C. Tietze, "Maternal Mortality Excluding Abortion Mortality", *World Health Statistics Report*, 30: 312-338, 1979.
30. "World Abortion Trends", *Population*, No. 9, 1982.
31. L. S. Liskin, "Complications of Abortion in Developing Countries", *Population Reports*, Series F, No. 7: F105-155, 1980.
32. R. W. Rochat, D. Kramer, P. Senanayake and C. Howell, "Induced Abortion and Health Problems in Developing Countries", *The Lancet*, 2: 484, 1980.
33. T. Narkavonnanakit, "Abortion in Rural Thailand: A Survey of Practitioners", *Studies in Family Planning*, 10: 223-229, 1979.
34. "Cost of Illegality", *People*, 3: 28, 1976.
35. C. Tietze, "New Estimates of Mortality Associated with Fertility Control", *Family Planning Perspectives*, 9: 74, 1977.
36. H. W. Ory, A. Rosenfield and L. Landman, "The Pill at 20: An Assessment", *Family Planning Perspectives*, 12: 278, 1980.
37. Asociación Chilena de Protección de la Familia, "Actualización del Documento 'Evaluación de 10 Años de Planificación Familiar en Chile'", unpublished, 1978.
38. N. H. Wright, "Family Planning and Infant Mortality Rate Decline in the United States", *American Journal of Epidemiology*, 101 (3): 182-187, 1975.
39. G. Rodriguez, "Family Planning Availability and Contraceptive Practice", *Family Planning Perspectives*, 11: 51-56, 67-70, 1979.
40. J. W. Brackett, "The Role of Family Planning Availability and Accessibility in Family Planning Use in Developing Countries", in *World Fertility Conference, London, 1980: Record of Proceedings*, 2: 19-49, International Statistical Institute, Voorburg, Netherlands, 1980.
41. Central Bureau of Statistics, Ministry of Economic Planning and Development, *Kenya Fertility Survey, 1977-1978, First Report*, Volume 1, Nairobi, 1980.

Food Supplements

by Kusum P. Shah

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One of the most important underlying causes of infant deaths in developing countries is low birth-weight. In total, more than 23 million babies a year are born weighing less than 2,500 grams and 90% of them are born into the developing world. Accounting for between 12% and 15% of births, but between 30% and 40% of infant deaths, these low-birth-weight babies are therefore approximately three times more likely to die in infancy than babies of normal weight at birth. But neither the incidence of low birth-weight nor the risks attached are spaced evenly around the globe. In some areas of Guatemala, for example, a third of all babies are born with low birth-weights and half of them will not live to see their second birthday. In parts of Asia, one baby in two is born below 2,500 grams and, according to a study in one rural health unit, the risk of peri-natal death is five times greater than for babies of normal weight. Even in the United States, most of the differences in infant mortality rates between whites and non-whites are directly associated with differences in birth-weights.

In the main, it is the low-birth-weight baby's low resistance, and consequently greater frequency and severity of infection, which explains its low survival rate. Tragically, the low-birth-weight baby is also more likely to become malnourished, even if breastfed. The reason is usually the same as the reason for low birth-weight itself - the very poor nutritional status of the mother. Severe maternal malnutrition adversely influences the capacity to lactate and the duration of breastfeeding.

The relationship between the mother's weight before pregnancy, her weight gain during pregnancy, and the birth-weight of the baby, has long been established. In one Indian study, for example, it was conclusively demonstrated that the major factor contributing to low birth-weight was the mother's own malnutrition - often since her own childhood. Another major cause is anaemia, which can reduce the iron necessary for foetal growth. Average birth-weights among women with haemoglobin levels of 6.5 grams, according to one study, were found to be 2.4 kilos as opposed to 2.8 kilos for women with haemoglobin levels of 10.5 grams. Investigations in India have shown that 50% to 60% of pregnant women in the lower socio-economic groups are affected by anaemia and similar findings have been reported in South America.

Just as infection plays a larger role in infant and child malnutrition than is generally realised, so its role in causing low birth-weight is also in need of more recognition and investigation. Malaria, chronic dysentery, diarrhoea, hookworm infestation, and tuberculosis, are all common illnesses among pregnant women in developing countries and they all affect birth-weight. Placental malaria, in particular, has been shown to reduce average birth-weights by between 100 grams and 300 grams.

Lastly, low birth-weight is considerably more common among babies born less than two years after a previous birth and among babies born to very young mothers whose own bodies are still growing and whose pregnancy increases the nutrient demands on both mother and child. Family spacing could therefore also play a part in reducing the incidence of low birth-weight and associated infant deaths.

But the most important factor remains the mother's own level of nutrition. Quite simply, if the mother does not have enough food in pregnancy, then the growing foetus will not receive the nourishment it needs. During pregnancy and breastfeeding, a woman needs to receive approximately 2,500 calories a day. In practice, many women in the poorer communities of the developing world receive nothing like this amount. One study by the Indian National Institute of Nutrition in Hyderabad, for example, showed that

pregnant women were receiving, on average, only about 1,400 calories a day or just 60% of their needs.

The result of too little food in pregnancy – often compounded by too much hard physical work – is that the mother-to-be does not gain enough weight during the nine months of gestation. And that weight gain is crucial not only to the satisfactory growth of the foetus but also to the build up of the ‘energy bank’ which the mother needs to draw on for childbirth, breastfeeding, and the one-thousand-and-one demands of looking after a new child. Without that ‘bank’ the mother’s own body will become overdrawn.

In the industrialised world, that weight-gain in pregnancy is usually around 12 kilos, whereas in the developing world many women – probably the majority – gain only perhaps 6 kilos or less during pregnancy. If that pregnancy is at the ‘wrong’ season of the year – say, for example, the rainy season when last year’s food is running low and hoeing and planting the new crop means that energy demands are high – then a woman’s weight gain in pregnancy is likely to be even less. It has been observed in a Gambian village, for example, that weight-gain during pregnancy varies between 2.7 kilos and 5.5 kilos according to the different seasons.

The consequence of insufficient weight increase during pregnancy is likely to be low birth-weight. But for the child, the consequences do not stop there. Inadequate diet may also affect the mother’s capacity to breastfeed – and so, tragically, the low-birth-weight infant may be deprived of adequate nutrition by the same cause which resulted in low birth-weight itself. But for the majority of mothers in poor communities, even if they are malnourished, breastfeeding is still the best way to protect an infant from malnutrition and infection. If the malnutrition of the mother is severe, and weight gain in pregnancy is minimal, then the quality and quantity and duration of breastfeeding can also be affected.

Consequently, the already vulnerable infant finds itself pushed, almost from birth, into the vicious cycle of malnutrition and infection. Low birth-weight and weight-faltering in early infancy

therefore becomes a major cause of infant mortality and the sabotaging of health and growth. A WHO-aided study in India, for example, found that one third of low-birth-weight babies were moderately or severely malnourished by the age of six months and that by the age of one year, the proportion had risen to half. By contrast, among babies weighing 3.1 kilos or more at birth, only one in twelve was similarly malnourished at the age of six months and one in six at the age of one year. In other words, malnutrition in infants was three to four times more likely for low-birth-weight babies.

In view of such evidence, it is not surprising that approximately 4 million out of approximately 12 million infants who now die each year are low birth-weight babies. For they are virtually born into the vicious cycle of malnutrition and infection which claims the majority of those young lives. Coupled with the significant evidence of its negative effect on a child’s social and intellectual development, this means that low birth-weight is also a major contributor to that other tragic cycle of malnutrition, ill-health, impaired mental and physical development, lower productivity, continued poverty, and perpetuated malnutrition and ill-health.

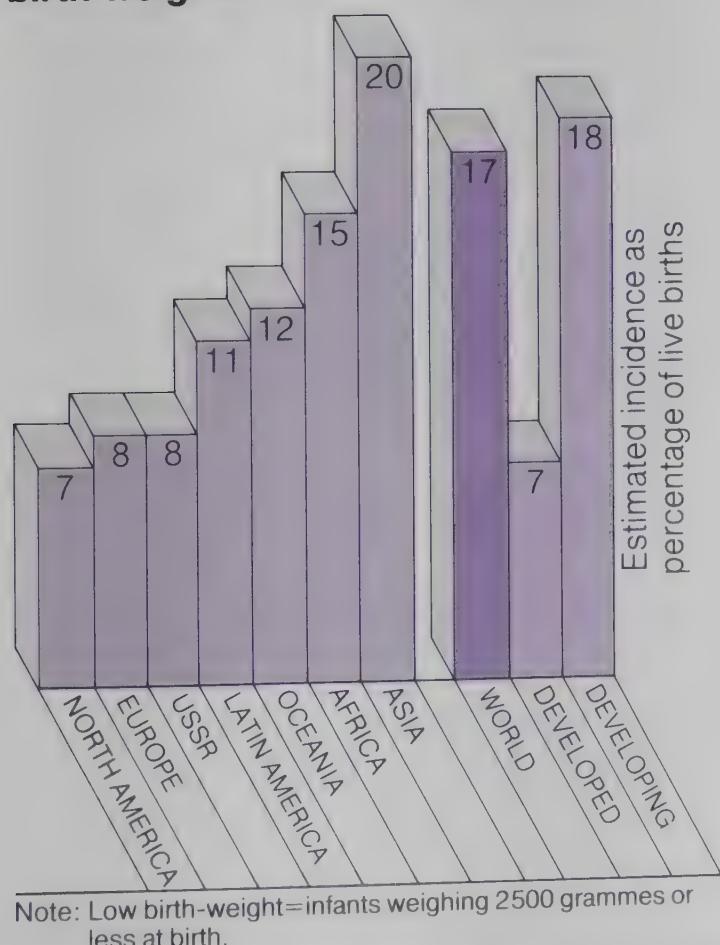
This cycle must be broken into for the sake of the development of both the child and the community. The ultimate solution to the problem is, of course, overall socio-economic development. But there are immediate actions which can reach the unreachéd *today* and significantly reduce the risks to life and health. Appropriate, simple technology is available for the effective application of recent scientific knowledge. And if those immediate actions can help to break into the self-perpetuating cycle of malnutrition and infection, poor growth and continued poverty, then they can also play an important role in supporting that long-term development itself. The quality of a population’s health is a key factor to development itself. The future health of mankind therefore depends, to a great extent, on the nutritional status of mothers.

Preventing low birth-weight is one of the most cost-effective ways of breaking into that cycle, saving the lives of many millions of children, and

protecting the healthy growth of many millions more. And there is now evidence that the incidence of low birth-weight can indeed be reduced – by the simple method of supplementing the diet of at-risk pregnant women.

As a general rule, a total supplement of 10,000 calories for a severely malnourished pregnant woman during the last three months can increase her baby's birth-weight by 50 grams. An average of 600 calories a day for those three months could lead to an increase in birth-weight of approximately 300 grams. This means that in a community where 20% of births are low birth-weight and 8% are lower than 2.2 kilos, such a supplement could be expected to reduce low birth-weights by about 60%. A more dramatic change in the survival and healthy growth chances of infants and children in the developing countries would be

Fig. 2.9 Global incidence of low birth-weights



Source: WHO. World Health Statistics Quarterly. The Incidence of Low Birth-weight
A Critical Review of Available Information. Vol. 33 No. 3. Geneva 1980

hard to imagine. And the cost, for so great a gain, is no more than a few dollars per woman at risk.

The impact and cost-effectiveness could be even greater if the proportion of low-birth-weight babies is high, if food supplements are targeted to severely malnourished women alone, and if such supplements are indeed consumed by the women and not shared with others or used instead of buying food.

In villages of Guatemala, for example, infant mortality rates have been reduced from 135 to 51 per 1,000 after a health care and food supplementation programme had been started. Among one group of mothers, the incidence of low birth-weight was reduced from 30% to only 4%. And when birth-weight was at least 2,750 grams and the child was breastfed, the neonatal survival rate approached 100%. It was not possible to isolate the separate contributions of food supplementation and health care.

The question of how to put this relatively new knowledge into practice remains the major problem. In general, food supplementation programmes have not been particularly successful so far – often failing to reach all needy and severely malnourished mothers and children at the grassroots levels. Many also tend to be expensive, to require sophisticated logistics to transport food supplies to remote places, and to foster a passive 'hand-out' mentality instead of helping to develop local self-reliance.

Alternative and more effective approaches have been developed. But they have not yet been widely replicated. Essential to their success are community involvement, health education, and the mobilisation of every possible resource and organisation within the community – health workers, religious leaders, traditional birth attendants, women's groups, mothers' associations, older school-children. Such programmes can develop systems of surveillance based on simple technologies like portable weighing-scales, tri-coloured arm-circumference measuring bands (an arm circumference of less than 22.5 centimetres is an indication of risk of low birth-weight) and weight-gain cards kept by the mother-to-be in her own home. Such surveillance can also be improved with the knowledge that the chances of

II LIFELINES: FOOD SUPPLEMENTS

low birth-weight rise, if the birth follows very closely after a previous birth, if there have been four or more previous pregnancies, if women have previously given birth to low-birth-weight babies, if weight gain is less than 1.5 kilos a month over the last three months, or if a woman is very pale and obviously anaemic.

Once all pregnant women at risk have been identified, the supplementary foods themselves should preferably be found cheaply and locally and be based as much as possible on local production in order to minimise dependence. And if such supplementary foods are to be actually eaten by the women who need them, then education about the importance of diet in pregnancy and lactation will be necessary not just for the women themselves but for the whole community. The distribution of iron and folic acid tablets can also help to counteract specific nutrient deficiencies. But the most important task is to help create a new recognition among families and communities that pregnancy and infancy are vital and vulnerable times and deserve priority in the allocation of the food which is available.

If food supplements for women at risk can be extended to the period of lactation, then the protection which breastfeeding affords can be extended further across the child's life. But between the age of four and six months, the child needs semi-solids and solid foods (though breastfeeding should also be continued for as long as possible). To avoid faltering growth, it is essential

that parents know that this is the right age for weaning to begin. In some parts of India, only about 2% of infants in villages are receiving semi-solids even at the age of six to eight months. Most parents are willing to accept that weaning should begin earlier if they perceive the need for themselves on a growth chart which actually makes the child's nutritional progress – or lack of it – visible to the parents themselves.

Nutrition education – as well as food supply only for the families with at-risk women – can again play a vital role in protecting health and growth during the weaning months. The weaning food itself should be based on foods which are easily available and easy to make – preferably foods from the family pot including, wherever possible, peas, beans, green leafy vegetables, cereals, fruit, groundnuts, yoghurt and milk.

Finally, a special plea must be added on behalf of the young girls of the developing world who are so often neglected and ignored – receiving a smaller share of the food and performing a larger share of the work than the male members of their families. Such burdens can also reduce a teenage girl's chances of optimal growth. And many studies have now shown that low birth-weights are also strongly related to poor nutrition of the mother in her own childhood. That is why one of the main messages in my work with mothers in India has been, 'If you want a healthy grandchild, take care of your daughters now.'

III

STATISTICS

Economic and social statistics on the nations of the world, with particular reference to children's well-being

The pattern of child deaths (Figs. 3.1 to 3.8)

Country Index to Tables

Definitions, main sources, general note on data

TABLES

1: Basic Indicators

IMR population child population GNP per capita
 life expectancy adult literacy school enrolment
 income distribution

2: Nutrition

Low birth-weight breastfeeding malnutrition food production
 calorie intake

3: Health

Access to water immunization of children immunization of mothers life expectancy

4: Education

Male and female literacy primary school enrolment
 secondary school enrolment

5: Demographic Indicators

Infant deaths child deaths death rate birth rate
 fertility rate population growth

6: Economic Indicators

GNP per capita growth rate inflation poverty
 urbanisation aid

Footnotes and Source notes for Tables 1-6

III THE PATTERN OF CHILD DEATHS

Fig. 3.1 The developing world's share of population, births, and deaths

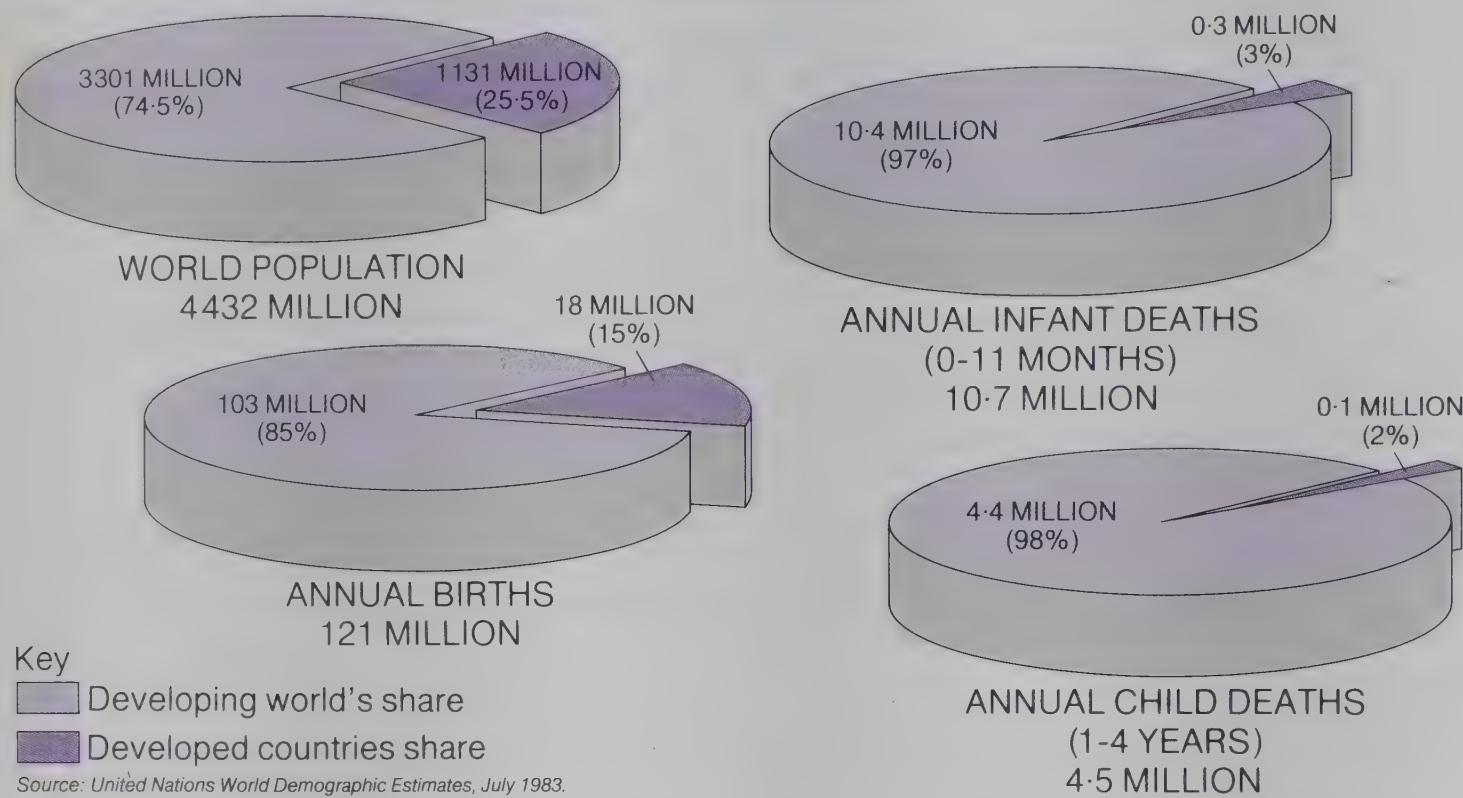
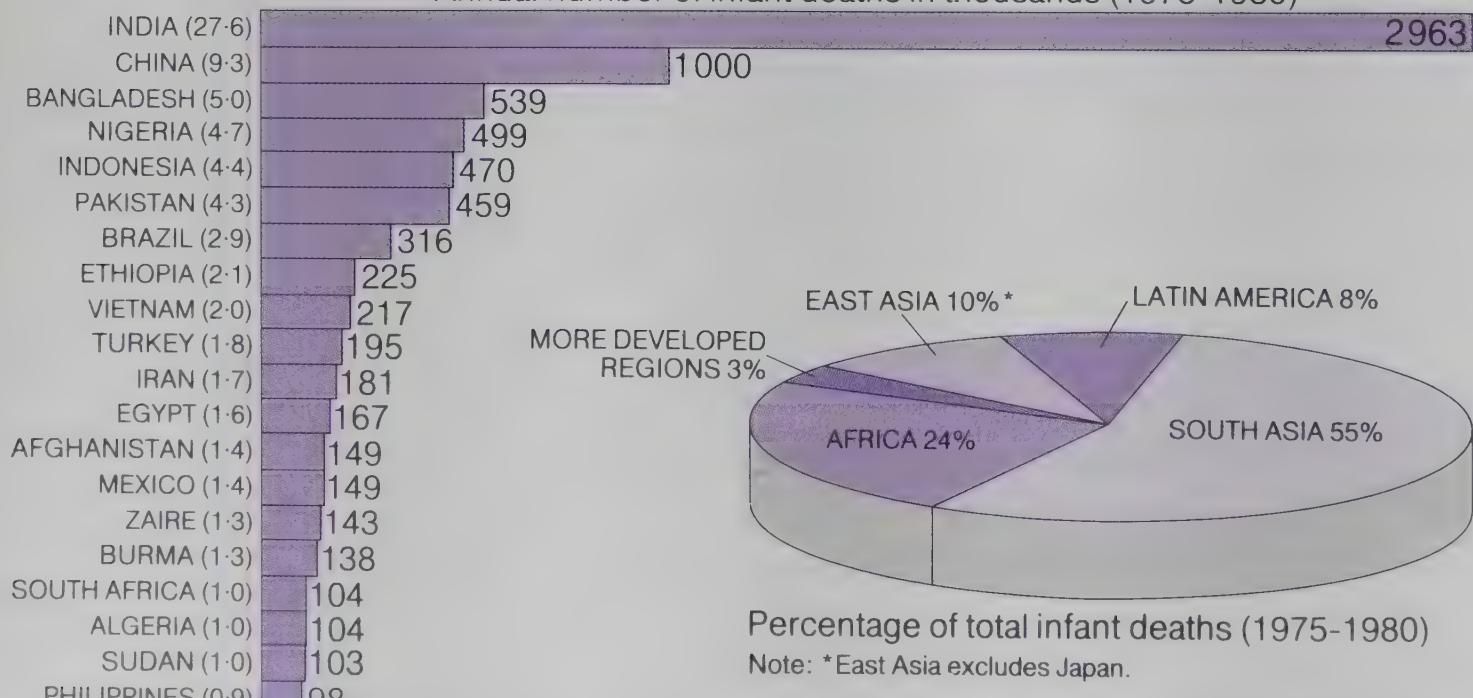


Fig. 3.2 Where children die: countries with the greatest number of infant deaths

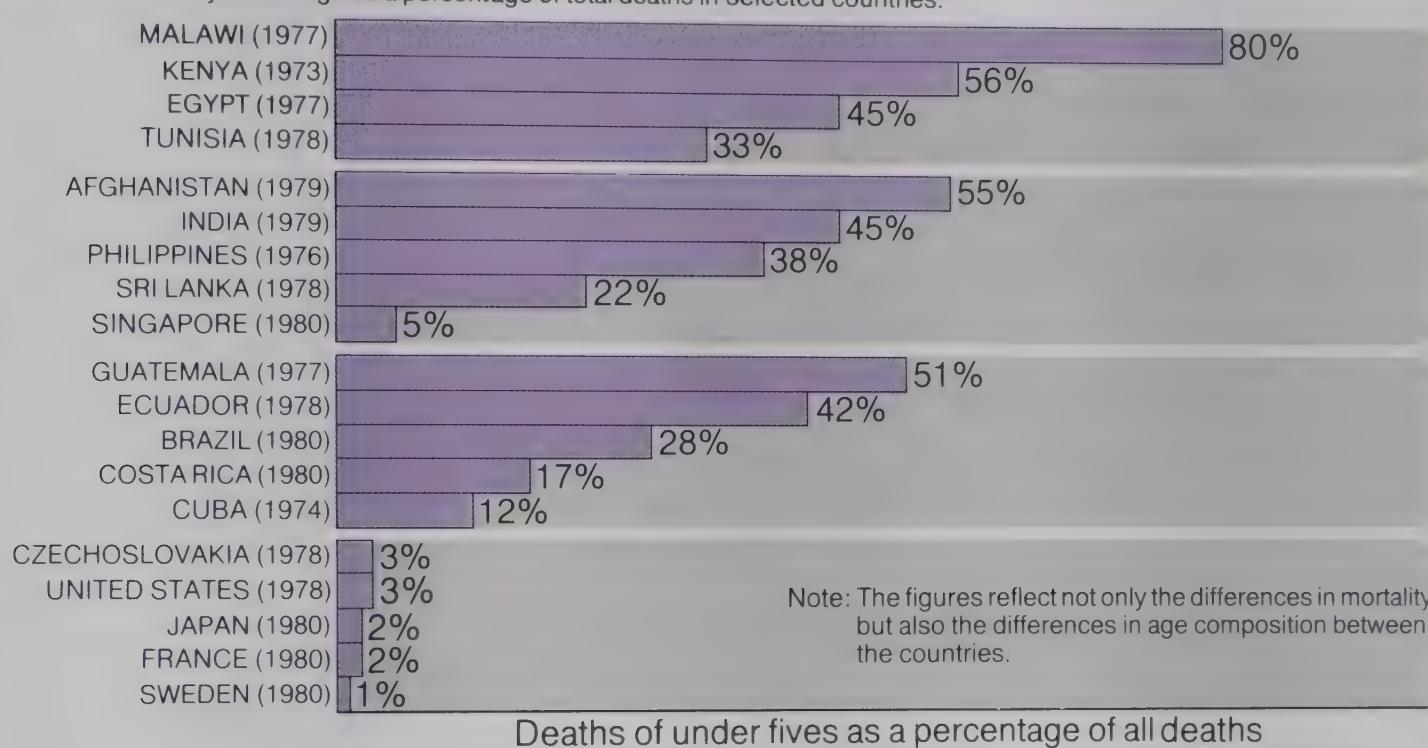
Annual number of infant deaths in thousands (1975-1980)



Note: Figures in parentheses are the percentages of the world total.

Fig. 3.3 The child's share

Deaths under five years of age as a percentage of total deaths in selected countries.

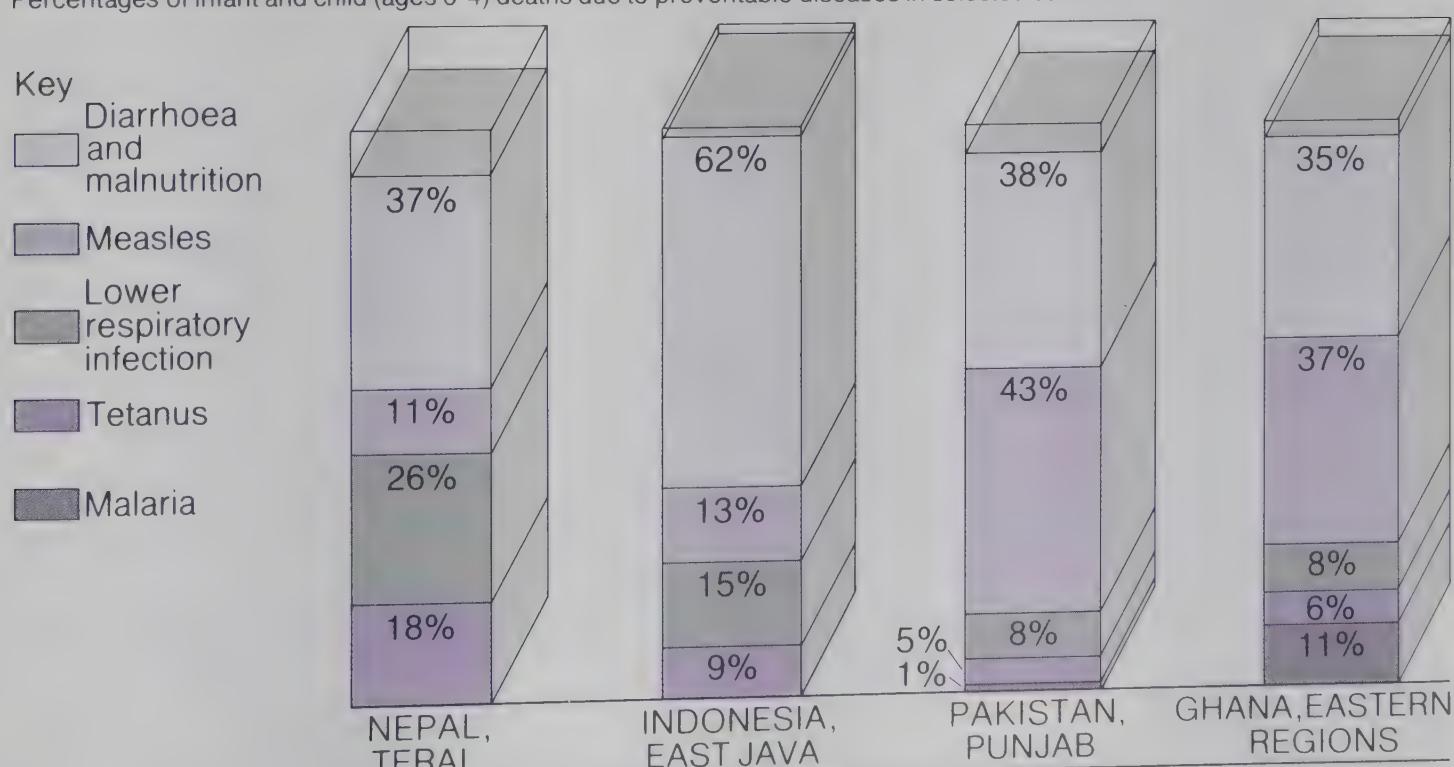


Note: The figures reflect not only the differences in mortality, but also the differences in age composition between the countries.

Source: United Nations Demographic Yearbook, 1981.

Fig. 3.4 Why children die

Percentages of infant and child (ages 0-4) deaths due to preventable diseases in selected countries.



Source: Robert N. Grosse. *Interrelation between health and population: Observations derived from field experiences. Social Science and Medicine*. Vol. 14c, No. 2, June 1980 p. 103.

III THE PATTERN OF CHILD DEATHS

Fig. 3.5 Reducing child deaths

Trends in infant mortality in the developing countries, 1950-1980.

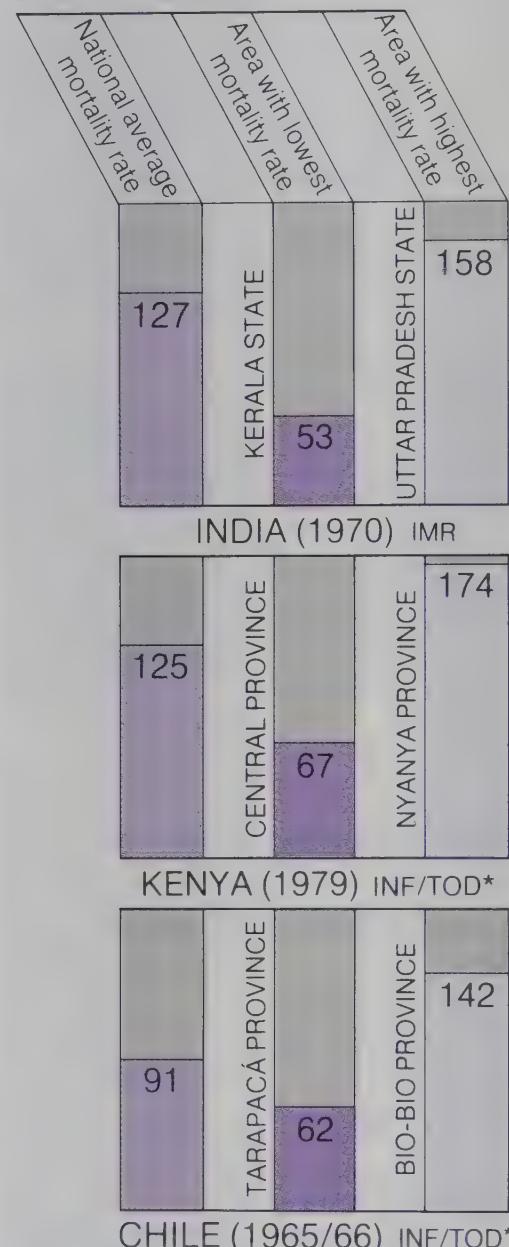


Key

| | |
|------|------|
| 1950 | 1960 |
| 1970 | 1980 |

Source: United Nations. *Infant Mortality Rate by Region and Country 1950-2025, Medium Variant Population Bulletin of the United Nations*. No. 14. 1982 pp.36-41

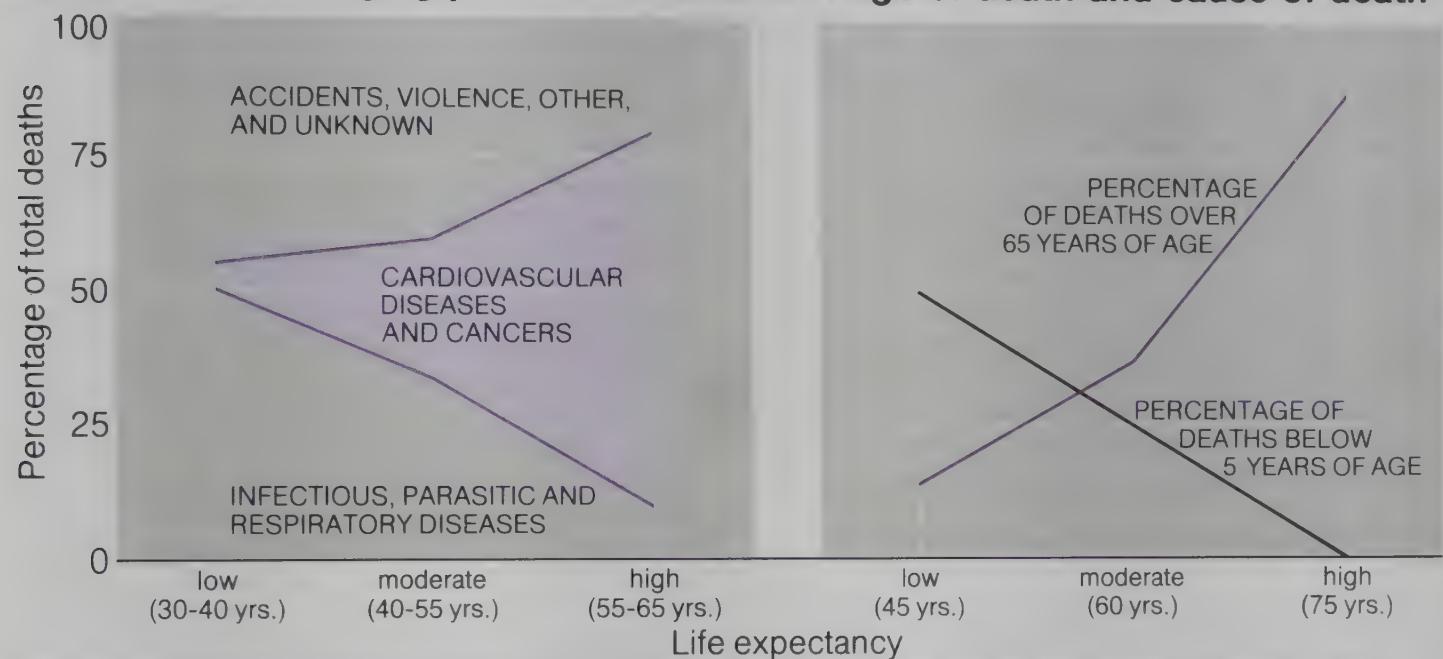
Fig. 3.6 Differences within nations



Note: *The infant/toddler mortality rate is the number of deaths before age two per 1000 live births.

Sources: Derived from: (1) Government of India, Ministry of Health & Family Welfare. Year Book, 1975-76. New Delhi. (2) W. Henry Mosley. Will Primary Health Care Reduce Infant and Child Mortality? A Critique of Some Current Strategies, with Special Reference to Africa and Asia. Paper Prepared for the International Union for the Scientific Study of Population (IUSPP) Seminar on Social Policy, Health Policy and Mortality Prospects. Paris. February 28-March 4, 1983. (3) La Mortalidad en Los Primeros Anos de Vida – En Paises De La America Latina: Chile, 1965-1966 (by Hugo Behm and Monica Correa), Centro Latinoamericano de Demografia (CELADE), San Jose, June 1977

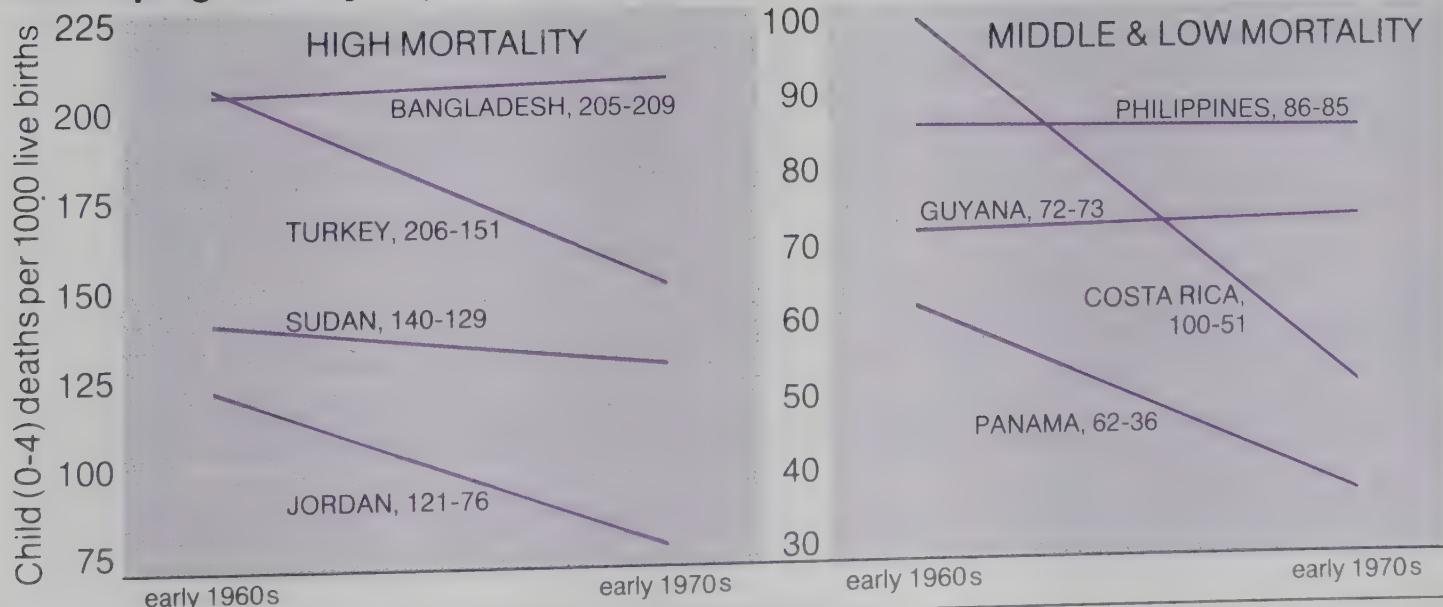
Fig. 3.7 The changing pattern: transitions in age of death and cause of death



Sources: Data on cause of death for moderate and low mortality are from World Health Organization data bank, as presented by United Nations Population Division; figures for high mortality are judgemental extrapolations. Figures on age of death are from West family Coale-Demeny model life tables, incorporating fertility assumption of GRR of 3.0 at high mortality, 2.0 at moderate mortality, and 1.0 at low mortality.

The graphs above describe the two transitions – in age at death and cause of death – which occur as mortality rates move from high to low levels. When death rates are high most deaths occur at an early age and from causes such as diarrhoeal, respiratory, and parasitic infections, and from immunizable diseases. As death and birth rates fall, more deaths occur at higher ages and from causes such as strokes, heart-attacks and cancers.

Fig. 3.8 It can be done: mortality reduction among children under five, some developing country experiences



Source: World Fertility Survey. Findings of the World Fertility Survey on Trends, Differentials, and Determinants of Mortality in Developing Countries. Paper Prepared for the Expert Group Meeting on Mortality and Health Policy. Rome. May 30-June 3, 1983.

General Note on the Data

The data provided in these tables are accompanied by definitions, sources, explanation of signs and individual footnotes where the definition of the figure is different from the general definition being used. Tables derived from so many sources – nine major sources are listed in the explanatory material – will inevitably cover a wide range of reliability. The following general comments on the data might therefore be useful. The data are provided for 130 countries with a population of three quarters of a million or more. Where possible the official government data have been used. In the many cases where there are no reliable official figures, estimates made by the relevant United Nations agency have been used. Where such internationally standardised estimates are not available, we have used the best estimate of the UNICEF field office. All such UNICEF field office estimates are marked with an *

In some cases e.g. Infant Mortality Rate, Life Expectancy, Crude Birth Rate, Crude Death Rate, etc. the figures are part of the regular United Nations work on estimates and projections – in this case by the United Nations Population Division. In some cases e.g. GNP per capita or ODA, the data are the result of a continuous process of revising and updating – in this case by the World Bank and OECD respectively.

It is not feasible to list the data in terms of the reliability as this will vary enormously from country to country within any one subject. As a general guide it would be reasonable to say that data for nutrition and health are weaker than for education which is in turn weaker than demographic data, with the economic data being the most reliable of all. Similarly, the richer a country the more likely that it has provided sufficient resources to produce reliable data – the absence of the share of income data for most of the poorest countries is a good example.

Where possible only comprehensive or sample national data have been used although, as in the table on 'Wasting', there are a few exceptions. Where the figures refer to only a part of the country this is indicated in a footnote.

Because of all the caveats the reader is recommended to use these data with caution and not to draw too much significance from small differences. The remarks of the World Bank, prefacing the statistical annex in the 1983 World Development Report are particularly appropriate:— '*Because the coverage of economies is not uniform for all indicators and because the variation around central tendencies can be large, readers should exercise caution in comparing the summary measures for different indicators, groups, and years or periods. Readers should also exercise caution in comparing indicators across economies. Although the statistics are drawn from sources generally considered the most authoritative and reliable, some of them, particularly those describing social features and income distribution, are subject to considerable margins of error. In addition, variations in national statistical practices mean that the data in certain instances are not strictly comparable. The data should thus be construed only as indicating trends and characterizing major differences between economies.*'

It is with these caveats in mind that in ranking countries by the main indicator used in these tables – the estimate of the Infant Mortality Rate – 1981 – we have rounded all rates to the nearest 10 in the case of countries with a rate of 50 or more. Only in countries with rates below 50, where there is probably a very comprehensive registration system, have we rounded the figure to the nearest unit. Throughout the table we have avoided the use of decimals unless its use was clearly necessary in order to show differences as in the case of annual growth rates, inflation rates, etc.

Signs and Explanations

Unless otherwise stated, the summary measures for the four I.M.R. groups of countries are the median values for each group. The median is the middle value of a data set arranged in order of magnitude. Special footnotes are shown at the end of the tables.

T Total for the group.

... Data not available.

* UNICEF field office estimate.

(.) Less than half the unit shown.

Most of the IMR figures are estimates prepared by the UN Population Division on an internationally comparable basis using various sources. In some cases, these estimates may differ from national figures.

Index to Countries

In the following tables, the countries are listed in descending order of infant mortality. Countries with the same rates are listed alphabetically. The reference numbers indicating that order are shown in the alphabetical list of countries below.

| | | | | | |
|-----------------------|-----|------------------------|-----|---------------------------|-----|
| Afghanistan | 2 | Haiti | 39 | Panama | 96 |
| Albania | 79 | Honduras | 57 | Papua New Guinea | 51 |
| Algeria | 37 | Hong Kong* | 122 | Paraguay | 80 |
| Angola | 8 | Hungary | 102 | Peru | 59 |
| Argentina | 81 | India | 32 | Philippines | 76 |
| Australia | 119 | Indonesia | 47 | Poland | 103 |
| Austria | 110 | Iran | 48 | Portugal | 100 |
| Bangladesh | 24 | Iraq | 65 | Romania | 97 |
| Belgium | 111 | Ireland | 116 | Rwanda | 21 |
| Benin | 9 | Israel | 108 | Saudi Arabia | 42 |
| Bhutan | 10 | Italy | 109 | Senegal | 22 |
| Bolivia | 25 | Ivory Coast | 33 | Sierra Leone | 3 |
| Botswana | 61 | Jamaica | 99 | Singapore | 117 |
| Brazil | 62 | Japan | 129 | Somalia | 18 |
| Bulgaria | 104 | Jordan | 69 | South Africa | 60 |
| Burma | 45 | Kampuchea | 4 | Spain | 123 |
| Burundi | 30 | Kenya | 66 | Sri Lanka | 83 |
| Cameroon | 38 | Korea, Dem. Rep. of | 90 | Sudan | 35 |
| Canada | 120 | Korea, Rep. of | 91 | Sweden | 130 |
| Central African Rep. | 11 | Kuwait | 92 | Switzerland | 127 |
| Chad | 12 | Lao People's Dem. Rep. | 27 | Syria | 73 |
| Chile | 84 | Lebanon | 86 | Tanzania | 52 |
| China | 85 | Lesotho | 40 | Thailand | 77 |
| Colombia | 72 | Liberia | 15 | Togo | 43 |
| Congo | 26 | Libya | 49 | Trinidad and Tobago | 93 |
| Costa Rica | 98 | Madagascar | 70 | Tunisia | 53 |
| Cuba | 105 | Malawi | 6 | Turkey | 36 |
| Czechoslovakia | 107 | Malaysia | 95 | Uganda | 54 |
| Denmark | 124 | Mali | 16 | USSR | 101 |
| Dominican Rep. | 67 | Mauritania | 19 | United Arab Emirates | 78 |
| Ecuador | 63 | Mauritius | 89 | United Kingdom | 118 |
| Egypt | 31 | Mexico | 74 | United States | 115 |
| El Salvador | 64 | Mongolia | 75 | Upper Volta | 1 |
| Ethiopia | 13 | Morocco | 50 | Uruguay | 88 |
| Finland | 128 | Mozambique | 41 | Venezuela | 87 |
| France | 121 | Nepal | 17 | Viet Nam | 55 |
| German Dem. Rep. | 112 | Netherlands | 125 | Yemen Arab Rep. | 5 |
| Germany, Fed. Rep. of | 113 | New Zealand | 114 | Yemen, People's Dem. Rep. | 23 |
| Ghana | 46 | Nicaragua | 58 | Yugoslavia | 94 |
| Greece | 106 | Niger | 20 | Zaire | 44 |
| Guatemala | 68 | Nigeria | 28 | Zambia | 56 |
| Guinea | 7 | Norway | 126 | Zimbabwe | 71 |
| Guinea-Bissau | 14 | Oman | 29 | | |
| Guyana | 82 | Pakistan | 34 | * Colony | |

Main Sources

| | | | |
|--------------------------------------|---|---------------------------------------|--|
| Infant Mortality: | United Nations Population Division and World Bank | Children's Immunization: | World Health Organization (WHO) |
| Total Population: | United Nations Statistical Office and United Nations Population Division | Pregnant Mothers Immunization: | World Health Organization (WHO) |
| Child Population 0–4: | United Nations Population Division | Secondary Enrolment: | United Nations Educational, Scientific and Cultural Organization (UNESCO) |
| GNP Per Capita: | World Bank | Child Death Rate: | World Bank |
| Life Expectancy: | United Nations Population Division and World Bank | Crude Death Rate: | United Nations Population Division |
| Adult Literacy: | United Nations Educational, Scientific and Cultural Organization (UNESCO) | Crude Birth Rate: | United Nations Population Division |
| Primary Enrolment: | United Nations Educational, Scientific and Cultural Organization (UNESCO) | Total Fertility Rate: | United Nations Population Division |
| Share of Household Income: | World Bank | Rate of Inflation: | World Bank |
| Low Birth Weight: | World Health Organization (WHO) | Absolute Poverty Level: | World Bank |
| Breastfeeding: | World Health Organization (WHO) and World Fertility Survey | ODA: | Organisation for Economic Co-operation and Development (OECD) |
| Wasting (acute malnutrition): | World Health Organization (WHO) | ODA as Percentage of GNP: | Organisation for Economic Co-operation and Development (OECD) and World Bank |
| Food Production: | Food and Agriculture Organization (FAO) and World Bank | | |
| Calorie Intake: | Food and Agriculture Organization (FAO) and World Bank | | |
| Access to Drinking Water: | World Health Organization (WHO) | | |

Definitions

Infant Mortality Rate: annual number of deaths of infants under one year of age per 1,000 live births.

Child Death Rate: annual number of deaths of children aged 1–4 years inclusive, per 1,000 population in the same age group.

Life Expectancy at Birth the number of years newborn children would live if subject to the mortality risks prevailing for the cross-section of population at the time of their birth.

Crude Death Rate: annual number of deaths per 1,000 population.

Crude Birth Rate: annual number of births per 1,000 population.

Total Fertility Rate: the number of children that would be born per woman, if she were to live to the end of her childbearing years and bear children at each age in accord with prevailing age-specific fertility rates.

Low Birth Weight: 2,500 grams or less.

Breastfeeding: either wholly or partly breastfeeding.

Prevalence of Wasting (acute malnutrition): the percentage of children with greater than minus two Standard Deviations from the 50th percentile of the weight for age reference population i.e. roughly less than 77% of the median weight for age of the National Centre for Health Statistics reference population.

DPT: Diphtheria, Pertussis (whooping cough) and Tetanus.

Adult Literacy Rate: percentage of persons aged 15 and over who can read and write.

Primary Enrolment Ratio: enrolment at the primary level as a percentage of the population of the age group corresponding to that level.

Secondary Enrolment Ratio: enrolment at the secondary level as a percentage of the age group corresponding to that level.

GNP: Gross National Product.

Absolute Poverty Level: that income level below which a minimum nutritionally adequate diet plus essential non-food requirements is not affordable.

ODA: Official Development Assistance.

TABLE 1: BASIC INDICATORS

| | Infant mortality rate aged 0-1 | | Total population (millions) 1981 | Child population aged 0-4 (millions) 1981 | GNP per capita (US \$) 1981 | Life expectancy at birth (years) 1981 | % adults literate male/female 1980 | % of age group enrolled in primary school male/female 1979-1981 | % share of household income 1972-1978 | |
|--|--------------------------------|------|----------------------------------|---|-----------------------------|---------------------------------------|------------------------------------|---|---------------------------------------|-----------------|
| | 1960 | 1981 | | | | | | | lowest 40% | highest 20% |
| Very high infant mortality countries (IMR over 100) | 180 | 140 | 1301.9T | 206.2T | 320 | 47 | 42/19 | 81/49 | | |
| 1 Upper Volta | 250 | 210 | 6.3 | 1.1 | 240 | 44 | 18/5 | 24/14 | | |
| 2 Afghanistan | 230 | 200 | 16.4 | 2.9 | 170 ^a | 37 | 26/6 | 49/11 | | |
| 3 Sierra Leone | 230 | 200 | 3.6 | 0.6 | 320 | 47 | 31/17 | 45/30 ^b | | |
| 4 Kampuchea | 150 | 190 | 6.8 | 0.8 | 70 ^c | 39 | 78/39 | 48/35 ^d | | |
| 5 Yemen Arab Rep. | 210 | 190 | 5.9 | 1.1 | 460 | 43 | 18/2 | 82/12 | | |
| 6 Malawi | 210 | 170 | 6.1 | 1.2 | 200 | 44 | 48/25 | 70/49 | | |
| 7 Guinea | 210 | 160 | 5.1 | 0.9 | 300 | 43 | 35/14 | 44/22 | | |
| 8 Angola | 210 | 150 | 7.3 | 1.3 | 490 | 42 | 36/19 | 85/48 ^d | | |
| 9 Benin | 210 | 150 | 3.5 | 0.7 | 320 | 50 | 40/17 | 84/39 | | |
| 10 Bhutan | 200 | 150 | 1.3 | 0.2 | 80 | 45 | .. / .. | 15/7 | | |
| 11 Central African Rep. | 200 | 150 | 2.3 | 0.4 | 320 | 43 | 48/19 | 89/49 | | |
| 12 Chad | 200 | 150 | 4.5 | 0.8 | 110 | 43 | 35/8 | 51/19 ^e | | |
| 13 Ethiopia | 180 | 150 | 32.2 | 5.9 | 140 | 46 | 11/5 ^f | 56/30 | | |
| 14 Guinea-Bissau | 190 | 150 | 0.8 | 0.1 | 190 | 37 | 25/13 | 130/59 | | |
| 15 Liberia | 190 | 150 | 2.0 | 0.4 | 520 | 54 | 42/18 | 82/50 | 11 ^g | 73 ^g |
| 16 Mali | 200 | 150 | 7.2 | 1.3 | 190 | 45 | 19/8 | 55/20 ^h | | |
| 17 Nepal | 200 | 150 | 15.0 | 2.5 | 150 | 45 | 34/6 | 126/53 | 13 | 59 |
| 18 Somalia | 180 | 150 | 4.9 | 0.9 | 280 | 39 | 11/3 | 38/21 | | |
| 19 Mauritania | 190 | 140 | 1.7 | 0.3 | 460 | 44 | .. / .. | 43/23 | | |
| 20 Niger | 190 | 140 | 5.5 | 1.1 | 330 | 45 | 14/6 | 29/17 ^h | | |
| 21 Rwanda | 150 | 140 | 5.1 | 1.0 | 250 | 46 | 61/39 | 74/67 | | |
| 22 Senegal | 180 | 140 | 5.8 | 1.1 | 430 | 44 | 31/14 | 58/38 | | |
| 23 Yemen, PDR | 210 | 140 | 2.0 | 0.4 | 460 | 46 | 48/16 | 93/51 ^b | | |
| 24 Bangladesh | 160 | 130 | 90.6 | 16.3 | 140 | 48 | 43/20 | 76/47 | 18 | 42 |
| 25 Bolivia | 170 | 130 | 5.8 | 1.0 | 600 | 51 | 79/58 | 90/78 | 13 ^g | 59 ^g |
| 26 Congo | 170 | 130 | 1.6 | 0.3 | 1,110 | 60 | 70/44 | .. / .. | | |
| 27 Lao, PDR | 160 | 130 | 3.8 | 0.6 | 80 | 43 | 51/36 | 105/89 | | |
| 28 Nigeria | 180 | 130 | 79.7 | 15.6 | 870 | 49 | 46/23 | 94/70 ^b | | |
| 29 Oman | 190 | 130 | 0.9 | 0.2 | 5,920 | 49 | .. / .. | 81/43 | | |
| 30 Burundi | 150 | 120 | 4.3 | 0.8 | 230 | 45 | 39/15 | 34/22 | | |
| 31 Egypt | 170 | 120 | 43.5 | 6.7 | 650 | 57 | 56/28 | 89/63 | 15 | 49 |
| 32 India | 170 | 120 | 676.2 | 95.8 | 260 | 52 | 55/29 | 86/57 | 16 | 49 |
| 33 Ivory Coast | 170 | 120 | 8.3 | 1.5 | 1,200 | 47 | 45/24 | 92/60 | 20 | 50 |
| 34 Pakistan | 160 | 120 | 84.6 | 14.7 | 350 | 50 | 39/18 | 73/30 | 20 ^g | 42 ^g |
| 35 Sudan | 170 | 120 | 18.9 | 3.4 | 380 | 47 | 38/14 | 60/43 | | |
| 36 Turkey | 190 | 120 | 45.4 | 6.6 | 1,540 | 62 | 80/50 | 110/93 | 12 | 57 |
| 37 Algeria | 170 | 110 | 19.6 | 3.7 | 2,140 | 56 | 60/24 | 106/81 | | |
| 38 Cameroon | 160 | 110 | 8.7 | 1.5 | 880 | 50 | 62/36 | 117/97 | | |
| 39 Haiti | 180 | 110 | 5.1 | 0.9 | 300 | 54 | 34/24 | 75/64 | | |
| 40 Lesotho | 140 | 110 | 1.4 | 0.2 | 540 | 52 | 58/81 | 84/123 | | |
| 41 Mozambique | 160 | 110 | 10.8 | 1.9 | 230 | 49 | 44/23 | 102/78 | | |
| 42 Saudi Arabia | 190 | 110 | 9.3 | 1.7 | 12,600 | 55 | 35/12 | 77/51 | | |
| 43 Togo | 180 | 110 | 2.7 | 0.5 | 380 | 48 | 46/20 | 144/89 | | |
| 44 Zaire | 150 | 110 | 29.4 | 5.3 | 210 | 50 | 74/37 | 104/75 ^h | | |
| High infant mortality countries (IMR 60 to 100) | 140 | 90 | 657.1T | 103.7T | 870 | 57 | 68/55 | 105/97 | | |
| 45 Burma | 160 | 100 | 36.2 | 5.7 | 190 | 54 | .. / .. | 87/81 ^b | 21 | 40 |
| 46 Ghana | 140 | 100 | 12.1 | 2.3 | 400 | 54 | 59/37 | 77/60 | | |
| 47 Indonesia | 150 | 100 | 150.5 | 20.1 | 530 | 54 | 77/58 | 119/104 | 14 | 49 |
| 48 Iran | 160 | 100 | 39.0 | 7.0 | 2,160 ^b | 58 | 55/30 | 121/80 ^b | | |
| 49 Libya | 160 | 100 | 3.1 | 0.6 | 8,450 | 57 | 76/36 | .. / .. | | |
| 50 Morocco | 160 | 100 | 20.6 | 3.7 | 860 | 57 | 41/18 | 95/58 | | |
| 51 Papua New Guinea | 170 | 100 | 3.1 | 0.5 | 840 | 51 | 48/30 | 70/54 | 12 ^g | 49 ^g |
| 52 Tanzania | 150 | 100 | 18.5 | 3.5 | 280 | 52 | 53/23 ^f | 110/98 | | |
| 53 Tunisia | 110 | 100 | 6.5 | 1.0 | 1,420 | 61 | 61/34 | 119/92 | 15 | 42 |
| 54 Uganda | 140 | 100 | 13.6 | 2.5 | 220 | 48 | 65/41 | 58/42 | 17 ^g | 47 ^g |
| 55 Viet Nam | 160 | 100 | 55.0 | 8.9 | 100 ^k | 63 | .. / .. | 120/105 | | |
| 56 Zambia | 150 | 100 | 6.0 | 1.2 | 600 | 51 | 79/58 | 101/89 | 11 | 57 |
| 57 Honduras | 150 | 90 | 3.8 | 0.7 | 600 | 59 | 64/62 | 96/95 | | |
| 58 Nicaragua | 140 | 90 | 2.8 | 0.5 | 860 | 57 | 61/60 ^f | 97/103 | 9 ^g | 65 ^g |
| 59 Peru | 160 | 90 | 18.3 | 2.9 | 1,170 | 58 | 89/73 | 116/108 | 7 | 61 |
| 60 South Africa | 140 | 90 | 30.1 | 4.9 | 2,770 | 63 | 81/81 | 105/105 ^d | | |
| 61 Botswana | 120 | 80 | 0.9 | 0.2 | 1,010 | 57 | 61/61 | 92/111 | 8 ^m | 60 ^m |
| 62 Brazil | 120 | 80 | 121.5 | 17.1 | 2,220 | 64 | 76/73 | 93/93 | 9 | 62 |
| 63 Ecuador | 140 | 80 | 8.6 | 1.5 | 1,180 | 62 | 82/76 | 109/105 | | |
| 64 El Salvador | 140 | 80 | 4.9 | 0.9 | 650 | 63 | 70/63 | 74/74 | | |

| | | Infant mortality rate aged 0-1 | | Total population (millions) 1981 | Child population aged 0-4 (millions) 1981 | GNP per capita (US \$) 1981 | Life expectancy at birth (years) 1981 | % adults literate male/female 1980 | % of age group enrolled in primary school male/female 1979-1981 | % share of household income 1972-1978 | | |
|---|----------------------|--------------------------------|------|----------------------------------|---|-----------------------------|---------------------------------------|------------------------------------|---|---------------------------------------|-----------------|---|
| | | 1960 | 1981 | | | | | | | lowest 40% | highest 20% | |
| 65 | Iraq | 140 | 80 | 13.5 | 2.5 | 3,020 ⁿ | 57 | 68/32 | 122/110 | . | . | |
| 66 | Kenya | 140 | 80 | 17.3 | 3.8 | 420 | 56 | 60/35 | 116/103 | 9 | 60 | |
| 67 | Dominican Rep. | 120 | 70 | 5.6 | 0.9 | 1,260 | 62 | 75/73 | 105/107 | 15 | 54 | |
| 68 | Guatemala | 90 | 70 | 7.5 | 1.3 | 1,140 | 59 | 59/44 | 74/63 | 13 ^a | 60 ^a | |
| 69 | Jordan | 140 | 70 | 3.4 | 0.6 | 1,620 | 62 | 78/53 | 105/102 ^p | . | . | |
| 70 | Madagascar | 110 | 70 | 9.0 | 1.6 | 330 | 48 | 68/55 | 100/87 ^t | . | . | |
| 71 | Zimbabwe | 120 | 70 | 7.6 | 1.5 | 870 | 55 | 77/61 | 118/113 | . | . | |
| 72 | Colombia | 100 | 60 | 28.8 | 4.0 | 1,380 | 63 | 86/84 | 127/130 | 10 ^a | 60 ^a | |
| 73 | Syrian Arab Rep. | 130 | 60 | 9.3 | 1.8 | 1,570 | 65 | 72/35 | 112/87 | . | . | |
| Middle infant mortality countries (IMR 26 to 50) | | 80 | 40 | 1663.8T | 172.8T | 1,770 | 69 | 90/85 | 107/104 | . | . | |
| 74 | Mexico | 90 | 50 | 71.2 | 11.7 | 2,250 | 66 | 86/80 | 121/115 | 10 | 58 | |
| 75 | Mongolia | 110 | 50 | 1.7 | 0.3 | 780 ^a | 64 | 93/86 | 107/102 | . | . | |
| 76 | Philippines | 110 | 50 | 49.5 | 7.7 | 790 | 63 | 90/88 | 111/108 | 14 ^a | 54 ^a | |
| 77 | Thailand | 100 | 50 | 47.5 | 6.6 | 770 | 63 | 93/83 | 85/80 ^b | 15 | 50 | |
| 78 | United Arab Emirates | 140 | 50 | 0.8 | 0.1 | 24,660 | 63 | 30/19 | 117/115 | . | . | |
| 79 | Albania | 80 | 46 | 2.8 | 0.4 | 840 ^a | 70 | ./. | 109/103 | . | . | |
| 80 | Paraguay | 90 | 46 | 3.3 | 0.5 | 1,630 | 65 | 90/83 | 106/98 | . | . | |
| 81 | Argentina | 60 | 44 | 28.1 | 2.8 | 2,560 | 71 | 95/94 | 116/116 | 14 ^a | 50 ^a | |
| 82 | Guyana | 70 | 43 | 0.9 | 0.1 | 720 | 70 | 96/93 | 96/95 | . | . | |
| 83 | Sri Lanka | 70 | 43 | 15.0 | 1.9 | 300 | 69 | 87/76 | 106/100 | 19 | 43 | |
| 84 | Chile | 110 | 42 | 11.3 | 1.3 | 2,560 | 68 | 94/91 | 118/116 | . | . | |
| 85 | China | 170 | 41 | 1007.8 | 98.0 | 300 | 67 | ./. | 132/110 | 18 ^a | 39 ^a | |
| 86 | Lebanon | 70 | 40 | 2.7 | 0.3 | 1,070 ^c | 66 | 83/64 | 123/114 | 11 ^s | 55 ^s | |
| 87 | Venezuela | 90 | 40 | 14.3 | 2.3 | 4,220 | 68 | 84/78 | 104/104 | 15 ^a | 48 ^a | |
| 88 | Uruguay | 50 | 39 | 2.9 | 0.3 | 2,820 | 71 | 95/95 | 107/104 | 16 ^a | 46 ^a | |
| 89 | Mauritius | 70 | 34 | 1.0 | 0.1 | 1,270 | 65 | 86/72 | 103/102 | 14 | 55 | |
| 90 | Korea, Dem. Rep. | 80 | 33 | 18.3 | 2.6 | 1,130 ^a | 66 | ./. | 118/114 ^e | . | . | |
| 91 | Korea, Rep. of | 80 | 33 | 38.7 | 4.4 | 1,700 | 66 | 96/88 | 108/105 | 17 | 45 | |
| 92 | Kuwait | 90 | 33 | 1.5 | 0.3 | 20,900 | 70 | 72/54 | 98/93 | . | . | |
| 93 | Trinidad and Tobago | 50 | 31 | 1.2 | 0.1 | 5,670 | 72 | 97/94 | 93/95 ^b | 13 | 50 | |
| 94 | Yugoslavia | 90 | 31 | 22.5 | 1.8 | 2,790 | 71 | 93/81 | 100/98 | 19 | 39 | |
| 95 | Malaysia | 70 | 30 | 14.4 | 2.1 | 1,840 | 65 | 79/61 | 94/91 | 11 | 56 | |
| 96 | Panama | 70 | 29 | 1.9 | 0.3 | 1,910 | 71 | 87/86 | 115/111 | 7 ^a | 62 ^a | |
| 97 | Romania | 80 | 29 | 22.4 | 2.0 | 2,540 | 71 | 97/94 | 101/101 | . | . | |
| 98 | Costa Rica | 80 | 27 | 2.3 | 0.3 | 1,430 | 73 | 92/92 | 109/106 | 12 ^a | 55 ^a | |
| 99 | Jamaica | 50 | 27 | 2.2 | 0.3 | 1,180 | 71 | 90/93 | 98/100 | . | . | |
| 100 | Portugal | 80 | 26 | 9.9 | 0.8 | 2,520 | 72 | 85/76 | 120/116 ^h | 21 ^a | 56 ^v | |
| 101 | USSR | 33 | 26 | 267.7 | 23.4 | 4,550 ⁿ | 72 | 99/98 | 97/97 ^t | . | . | |
| Low infant mortality countries (IMR 25 and less) | | 30 | 11 | 838.2T | 60.5T | 9,110 | 74 | 96/94 | 100/101 | . | . | |
| 102 | Hungary | 48 | 21 | 10.7 | 0.8 | 2,100 | 71 | 99/98 | 97/97 | 26 | 32 | |
| 103 | Poland | 60 | 21 | 35.9 | 3.2 | 3,900 ⁿ | 73 | 99/98 | 100/99 | . | . | |
| 104 | Bulgaria | 45 | 20 | 8.9 | 0.7 | 4,150 ⁿ | 73 | 96/93 | 97/96 | . | . | |
| 105 | Cuba | 70 | 19 | 9.7 | 0.8 | 1,410 ^a | 73 | 91/91 | 113/105 | . | . | |
| 106 | Greece | 40 | 18 | 9.7 | 0.7 | 4,420 | 74 | 94/83 | 103/102 | . | . | |
| 107 | Czechoslovakia | 24 | 17 | 15.3 | 1.3 | 5,820 ⁿ | 72 | ./. | 91/92 | . | . | |
| 108 | Israel | 31 | 16 | 3.9 | 0.5 | 5,160 | 73 | 96/91 | 94/96 | 21 ^a | 39 ^a | |
| 109 | Italy | 44 | 14 | 57.2 | 3.6 | 6,960 | 74 | 96/95 | 102/101 | 18 | 44 | |
| 110 | Austria | 38 | 13 | 7.5 | 0.4 | 10,210 | 73 | ./. | 100/99 | . | . | |
| 111 | Belgium | 31 | 12 | 9.9 | 0.6 | 11,920 | 73 | 99/99 | 101/101 | . | . | |
| 112 | German Dem. Rep. | 39 | 12 | 16.7 | 1.1 | 7,180 ⁿ | 73 | ./. | 95/97 | 18 | 45 | |
| 113 | Germany, Fed. Rep. | 34 | 12 | 61.7 | 3.0 | 13,450 | 73 | ./. | 103/101 | . | . | |
| 114 | New Zealand | 23 | 12 | 3.1 | 0.3 | 7,700 | 74 | ./. | 100/99 | 15 | 43 | |
| 115 | USA | 26 | 12 | 229.8 | 18.4 | 12,820 | 75 | 99/99 | ./. | 101/102 | . | . |
| 116 | Ireland | 29 | 11 | 3.4 | 0.4 | 5,230 | 73 | ./. | 101/102 | . | . | |
| 117 | Singapore | 36 | 11 | 2.4 | 0.2 | 5,240 | 72 | 88/70 | 108/105 | 20 ^a | 39 ^a | |
| 118 | United Kingdom | 23 | 11 | 55.8 | 3.2 | 9,110 | 74 | ./. | 104/105 | . | . | |
| 119 | Australia | 20 | 10 | 14.9 | 1.2 | 11,080 | 74 | ./. | 110/110 | 15 | 42 | |
| 120 | Canada | 27 | 10 | 24.3 | 1.9 | 11,400 | 75 | ./. | 100/100 | 16 | 46 | |
| 121 | France | 27 | 10 | 54.0 | 3.6 | 12,190 | 76 | 99/99 | 112/111 | . | . | |
| 122 | Hong Kong | 37 | 10 | 5.2 | 0.5 | 5,100 | 75 | 94/77 | 111/107 | 16 ^a | 47 ^a | |
| 123 | Spain | 50 | 10 | 37.7 | 3.1 | 5,640 | 74 | 96/91 | 109/109 | 18 | 42 | |
| 124 | Denmark | 22 | 8 | 5.1 | 0.3 | 13,120 | 75 | ./. | 97/97 | 20 | 38 | |
| 125 | Netherlands | 18 | 8 | 14.2 | 0.9 | 11,790 | 76 | ./. | 100/102 | 22 | 37 | |
| 126 | Norway | 19 | 8 | 4.1 | 0.3 | 14,060 | 76 | ./. | 99/100 | 19 ^a | 37 | |
| 127 | Switzerland | 21 | 8 | 6.4 | 0.4 | 17,430 | 76 | ./. | 86/87 ^h | 20 | 37 | |
| 128 | Finland | 21 | 7 | 4.8 | 0.3 | 10,680 | 75 | ./. | 83/83 | . | . | |
| 129 | Japan | 30 | 7 | 117.6 | 8.3 | 10,080 | 77 | 99/99 | 101/101 | 20 | 37 | |
| 130 | Sweden | 17 | 7 | 8.3 | 0.5 | 14,870 | 77 | ./. | 97/97 | 20 | 37 | |

TABLE 2: NUTRITION

| | % of infants with low birth-weights 1979 | % of mothers breast-feeding 1975-1980 | | | Prevalence of wasting aged 12-23 months (% of age group) 1975-1979 | Average index of food production per capita (1969-71=100) | Daily per capita calorie intake as % of requirements 1980 |
|--|--|---------------------------------------|----------|-----------|--|---|---|
| | | 3 months | 6 months | 12 months | | | |
| Very high infant mortality countries (IMR over 100) | 16 | | | | | 94 | 94 |
| 1 Upper Volta | 21 | . | . | . | 17 | 94 | 95 |
| 2 Afghanistan | . | . | . | . | . | 97 | 73 |
| 3 Sierra Leone | . | . | 94 | 83 | 26 | 81 | 89 |
| 4 Kampuchea | . | . | 80* | 54* | 17 | 45 | 88 |
| 5 Yemen Arab Rep. | . | . | . | . | . | 96 | 76 |
| 6 Malawi | . | . | . | 95*a | 36b | 96 | 94 |
| 7 Guinea | 18 | . | . | . | . | 87 | 77 |
| 8 Angola | 19 | . | . | . | . | 81 | 83 |
| 9 Benin | . | 95* | 90* | 75* | 17 | 96 | 103 |
| 10 Bhutan | . | . | . | . | . | 107 | 90 |
| 11 Central African Rep. | 23 | . | . | . | . | 102 | 94 |
| 12 Chad | 11 | . | . | . | . | 96 | 74 |
| 13 Ethiopia | 13 | . | 97* | 95* | . | 85 | 76 |
| 14 Guinea-Bissau | 9.0 | . | 96 | 92 | 8 | 83c | 102 |
| 15 Liberia | . | . | . | . | . | 95 | 114 |
| 16 Mali | 13 | . | 92 | 90 | 27 | 88 | 85 |
| 17 Nepal | . | . | . | . | . | 84 | 86 |
| 18 Somalia | . | . | . | . | . | 65 | 100 |
| 19 Mauritania | . | . | . | . | . | 77 | 97 |
| 20 Niger | . | . | . | . | . | 93 | 92 |
| 21 Rwanda | 17 | . | 94 | 82 | 26 | 104 | 88 |
| 22 Senegal | 10 | 94 | 94 | 82 | 22 | 76 | 100 |
| 23 Yemen PDR | . | 85d | 73d | 58d | 36 | 102 | 84 |
| 24 Bangladesh | 50 | 98 | 97 | 89 | 53 | 94 | 84 |
| 25 Bolivia | . | . | . | . | . | 102 | 87 |
| 26 Congo | 15 | . | 91a* | 62a* | . | 82 | 94 |
| 27 Lao, PDR | 18 | 98* | 94* | 90* | . | 110 | 97 |
| 28 Nigeria | 18 | . | 95* | 90* | 39e | 91 | 91 |
| 29 Oman | . | . | . | . | . | . | . |
| 30 Burundi | 14 | . | 95* | 90* | . | 100 | 96 |
| 31 Egypt | 14 | . | 91* | 84* | 3 | 90 | 117 |
| 32 India | 30 | . | . | . | . | 103 | 87 |
| 33 Ivory Coast | 14 | . | . | . | . | 110 | 112 |
| 34 Pakistan | 27 | 90 | 85 | 76 | 23 | 105 | 106 |
| 35 Sudan | 17 | 91 | 86 | 72 | . | 102 | 101 |
| 36 Turkey | . | . | 97a* | . | . | 112 | 122 |
| 37 Algeria | 10 | . | . | . | . | 81 | 101 |
| 38 Cameroon | 11 | . | 98 | 97 | 5 | 101 | 105 |
| 39 Haiti | . | 93 | 85 | 72 | 18 | 89 | 96 |
| 40 Lesotho | 15 | 93 | 89 | 75 | 11 | 86 | 107 |
| 41 Mozambique | . | . | . | . | . | 73 | 70 |
| 42 Saudi Arabia | . | . | . | . | . | . | 120 |
| 43 Togo | . | . | 99 | 90 | 9 | 90 | 95 |
| 44 Zaire | 16 | . | . | . | 10 | 87 | 94 |
| High infant mortality countries (IMR 60 to 100) | 14 | | | | | 97 | 99 |
| 45 Burma | 20 | 90* | 90* | 90* | 44a | 102 | 113 |
| 46 Ghana | . | . | . | . | 39 | 74 | 88 |
| 47 Indonesia | 18 | 93 | 92 | 76 | 26 | 118 | 110 |
| 48 Iran | 14 | . | . | . | . | 112 | 81 |
| 49 Libya | . | . | . | . | . | 141 | 147 |
| 50 Morocco | . | 95* | 90* | . | . | 81 | 110 |
| 51 Papua New Guinea | 25 | . | . | . | 52 | 97 | 90 |
| 52 Tanzania | 13 | . | . | . | . | 91 | 83 |
| 53 Tunisia | 7.3 | . | 92* | 71* | 3e | 124 | 116 |
| 54 Uganda | 10 | 85* | 70* | 20* | . | 86 | 83 |
| 55 Viet Nam | . | . | . | . | . | . | . |
| 56 Zambia | 14 | . | . | . | . | 112 | 90 |
| 57 Honduras | . | 48* | 28* | 24* | 10f | 92 | 93 |
| 58 Nicaragua | . | . | . | 71a* | 2f | 80 | 96 |
| 59 Peru | 9.0 | 80 | 70 | 53 | . | 87 | 99 |
| 60 South Africa | 15 | . | . | . | . | 84 | 99 |
| 61 Botswana | . | . | . | 97* | 13 | 104 | 118 |
| 62 Brazil | 8.7 | 75* | 48* | 6e | 81c | 81c | 94c |
| 63 Ecuador | . | . | . | 57a* | 125 | 109 | 109 |
| 64 El Salvador | 13 | . | . | . | 6f | 97 | 88 |
| | | | | | . | 104 | 99 |

| | % of infants with low birth-weights 1979 | % of mothers breast-feeding 1975-1980 | | | Prevalence of wasting aged 12-23 months (% of age group) 1975-1979 | Average index of food production per capita (1969-71=100) | Daily per capita calorie intake as % of requirements 1980 |
|---|--|---------------------------------------|-----------------|-----------------|--|---|---|
| | | 3 months | 6 months | 12 months | | | |
| 65 | Iraq | 6.1 | | | | | |
| 66 | Kenya | 18 | 89 | 84 | 44 | 89 | 111 |
| 67 | Dominican Rep. | 15 | 66 | 47 | 26 | 85 | 88 |
| 68 | Guatemala | 18 | | 84 | 74 | 99 | 105 |
| 69 | Jordan | 7.3 | 79 | 70 | 41 | 116 | 93 |
| 70 | Madagascar | 10 | | | 80 ^g | | |
| 71 | Zimbabwe | 15 | | | 88 ^{a*} | 94 | 109 |
| 72 | Colombia | 10 | 62 | 42 | 23 | 92 | 86 |
| 73 | Syrian Arab Rep. | | 88 | 72 | 41 | 122 | 108 |
| Middle infant mortality countries (IMR 26 to 50) | | 10 | | | | 110 | 116 |
| 74 | Mexico | 12 | 62 | 48 | 27 | 106 | 121 |
| 75 | Mongolia | | | | | 92 | 111 |
| 76 | Philippines | 20 | 78 | 69 | 53 | 122 | 116 |
| 77 | Thailand | 13 | 82 | 66 | 65 | 129 | 104 |
| 78 | United Arab Emirates | | | | | | |
| 79 | Albania | | | | | 106 | 110 |
| 80 | Paraguay | | 80 | 77 | 49 | 111 | 134 |
| 81 | Argentina | 6.0 | | | | 116 | 125 |
| 82 | Guyana | | 64 | 48 | 21 | 95 ^c | 109 |
| 83 | Sri Lanka | 21 | 88 | 82 | 60 | 148 | 102 |
| 84 | Chile | 13 | | | | 97 | 114 |
| 85 | China | 6.0 | | | | 116 | 107 |
| 86 | Lebanon | 12 | | | | 109 | 100 |
| 87 | Venezuela | 11 | 50 | 40 | 30 | 104 | 112 |
| 88 | Uruguay | 10 | 87 [*] | | | 104 | 110 |
| 89 | Mauritius | | | | | 88 ^c | 119 |
| 90 | Korea, Dem. Rep. | | | | | 134 | 126 |
| 91 | Korea, Rep. of | 8.0 | 94 ^e | 92 ^e | 62 ^e | 126 | 128 |
| 92 | Kuwait | | | | | | |
| 93 | Trinidad and Tobago | | 59 | 50 | 14 | 69 | 113 |
| 94 | Yugoslavia | 7.4 | | | | 117 | 140 |
| 95 | Malaysia | 9.0 | 47 ^e | 34 ^e | 19 ^e | 139 | 121 |
| 96 | Panama | 11 | 50 | 34 | 19 | 102 | 103 |
| 97 | Romania | | | | | 147 | 126 |
| 98 | Costa Rica | 8.5 | 38 | 20 | 9 | 110 | 116 |
| 99 | Jamaica | 10 | 57 | 40 | 16 | 90 | 119 |
| 100 | Portugal | | | | | 74 | 129 |
| 101 | USSR | 8.0 | | | | 102 | 132 |
| Low infant mortality countries (IMR 25 and less) | | 6.4 | | | | 115 | 133 |
| 102 | Hungary | 12 | 45 | 21 | 4 | 132 | 134 |
| 103 | Poland | 8.0 | 42 | 32 | | 96 | 134 |
| 104 | Bulgaria | | | | | 116 | 146 |
| 105 | Cuba | 10 | | | | 106 | 122 |
| 106 | Greece | | | | | 123 | 147 |
| 107 | Czechoslovakia | 6.1 | | | | 114 | 141 |
| 108 | Israel | 6.3 | | | | 103 | 118 |
| 109 | Italy | 11 | | | 1 | 112 | 150 |
| 110 | Austria | 5.8 | | | | 112 | 135 |
| 111 | Belgium | | 4 | | | 109 | 160 |
| 112 | German Dem. Rep. | 6.3 | | | | 129 | 144 |
| 113 | Germany, Fed. Rep. | 6.7 | | | | 110 | 133 |
| 114 | New Zealand | 4.9 | | | | 107 | 126 |
| 115 | USA | 7.4 | 33 ⁱ | 25 ^k | 8 | 116 | 139 |
| 116 | Ireland | | | | | 115 | 148 |
| 117 | Singapore | 11 | | | | 148 | 134 |
| 118 | United Kingdom | 7.0 | | | | 122 | 132 |
| 119 | Australia | 5.8 | | | | 117 | 117 |
| 120 | Canada | 6.4 | 26 | 13 | | 109 | 127 |
| 121 | France | 6.5 | 9 | | (.) | 117 | 134 |
| 122 | Hong Kong | 8.0 | | 18 ^e | | 71 | 128 |
| 123 | Spain | | | | | 125 | 135 |
| 124 | Denmark | 6.4 | | | | 111 | 133 |
| 125 | Netherlands | 4.0 | 17 | | | 116 | 131 |
| 126 | Norway | 4.2 | | | | 117 | 124 |
| 127 | Switzerland | | | | | 119 | 133 |
| 128 | Finland | 3.9 | | | | 103 | 118 |
| 129 | Japan | 5.1 | 56 ^j | 14 ^m | | 91 | 124 |
| 130 | Sweden | 3.6 | 35 ^m | | | 117 | 119 |

TABLE 3: HEALTH

| | % of population with access to drinking water 1980 | | % of one year old children fully immunized 1980 | | | | % of pregnant women fully immunized against tetanus 1980 | Life expectancy at birth (years) | | |
|--|--|-----------------|---|-----------------|-----------------|-----------------|--|----------------------------------|------|----|
| | urban | rural | TB | DPT | Polio | Measles | | 1960 | 1981 | |
| Very high infant mortality countries (IMR over 100) | 69 | 20 | 32 | 17 | 10 | 17 | | 37 | 47 | |
| 1 Upper Volta | 27 | 31 | 16 | 2 | 2 | 23 | 11 | 37 | 44 | |
| 2 Afghanistan | 28 | 8 | 8 | 3 | 3 | 6 | 3 ^a | 33 | 37 | |
| 3 Sierra Leone | 50 | 2 | 30 | 12 | 10 | 23 | .. | 37 | 47 | |
| 4 Kampuchea | .. | .. | .. | .. | .. | .. | .. | 46 | 39 | |
| 5 Yemen Arab Rep. | 100 | 18 | 15 | 3 | 3 | 4 | 0 ^a | 36 | 43 | |
| 6 Malawi | 77 | 37 | 86 | 66 | 68 | 65 | .. | 37 | 44 | |
| 7 Guinea | 69 | 2 | .. | .. | .. | .. | .. | 35 | 43 | |
| 8 Angola | 85 | 10 | 47* | 9* | 7* | 17* | .. | 33 | 42 | |
| 9 Benin | 26 | 15 | 37* | 20* | 45* | 6* | .. | 37 | 50 | |
| 10 Bhutan | 50 | 5 | 9 | 4 | 4 | 18 | 0 | 38 | 45 | |
| 11 Central African Rep. | 16 ^b | .. | .. | .. | .. | .. | .. | 35 | 43 | |
| 12 Chad | 26 ^b | .. | .. | .. | .. | .. | .. | 35 | 43 | |
| 13 Ethiopia | 80* | 5* | 10 | 6 | 6 | 7 | .. | 36 | 46 | |
| 14 Guinea-Bissau | 18 | 8 | .. | .. | .. | .. | .. | 32 | 37 | |
| 15 Liberia | 20 ^b | .. | 87 | 39 | 26 | 100 | 60 | 44 | 54 | |
| 16 Mali | 37 | 0 | 19 | .. | .. | .. | 1 | 37 | 45 | |
| 17 Nepal | 83 | 7 | 43 | 17 | 3 | 2 | 27 | 38 | 45 | |
| 18 Somalia | 20* | 42* | 3 | 2 | 2 | 3 | 5 ^a | 35 | 39 | |
| 19 Mauritania | 80 | 85 | 57 | 18 | 18 | 45 | 1 | 37 | 44 | |
| 20 Niger | 41 | 32 | 28 | 6 | 6 | 19 | 3 | 37 | 45 | |
| 21 Rwanda | 48 | 55 | 51 | 17 | 15 | 42 | 5 | 37 | 46 | |
| 22 Senegal | 77 | 25 | .. | .. | .. | .. | .. | 37 | 44 | |
| 23 Yemen PDR | 85 | 25 | 9 | 5 | 5 | 6 | 3 ^a | 36 | 46 | |
| 24 Bangladesh | 26 | 45 | 1 | 2 | 2 | 2 | 1 | 37 | 48 | |
| 25 Bolivia | 69 | 10 | .. | 10 | 10 | 14 ^h | .. | 43 | 51 | |
| 26 Congo | 40* | 8* | 92 | 42 | 42 | 49 | .. | 48 | 60 | |
| 27 Lao, PDR | 20* | 2* | 4 | .. | .. | .. | .. | 40 | 43 | |
| 28 Nigeria | 68* | 18* | 23 | 24* | 24* | 55 | 11 | 39 | 49 | |
| 29 Oman | .. | .. | 60 | 11 | 11 | 7 | 27 ^a | 38 | 49 | |
| 30 Burundi | 90 | 20 | 65 | 38 | 6 | 30 | .. | 37 | 45 | |
| 31 Egypt | 88 | 64 | 62 | 70 | 72 | 59 | 10 ^a | 46 | 57 | |
| 32 India | 77 | 31 | 14 | 35 | 11 | (.) | 17 | 43 | 52 | |
| 33 Ivory Coast | 19 ^b | .. | .. | .. | .. | .. | .. | 37 | 47 | |
| 34 Pakistan | 72 | 20 | 9 | 3 | 3 | 3 | 1 ^a | 43 | 50 | |
| 35 Sudan | 40 ^b * | .. | 2 | 1 | 1 | 1 | 1 ^a | 40 | 47 | |
| 36 Turkey | 95 | 62 | 47 | 64 | 69 | 52 | .. | 51 | 62 | |
| 37 Algeria | 77 ^b | .. | 59 | 33 | 30 | 17 | .. | 47 | 56 | |
| 38 Cameroon | 85* | 41* | 8 | 5 | 5 | 16 | .. | 37 | 50 | |
| 39 Haiti | 14 ^b | .. | 57* | 29* | 7* | .. | .. | 44 | 54 | |
| 40 Lesotho | 37 | 11 | 81 | 56 | 54 | 49 | .. | 42 | 52 | |
| 41 Mozambique | .. | .. | .. | .. | .. | .. | .. | 37 | 49 | |
| 42 Saudi Arabia | 92 | 87 | 43 | 25 | 34 | 10 | 0 ^a | 43 | 55 | |
| 43 Togo | 70 | 31 | .. | .. | .. | .. | .. | 42 | 48 | |
| 44 Zaire | .. | 16 ^b | .. | 34 | 18 | 18 | 20 | .. | 40 | 50 |
| High infant mortality countries (IMR 60 to 100) | 85 | 21 | 51 | 35 | 37 | 34 | | 47 | 57 | |
| 45 Burma | 38 | 15 | 20 | 8 | 2 | 0 | 9 | 44 | 54 | |
| 46 Ghana | 72 | 33 | .. | .. | .. | .. | .. | 45 | 54 | |
| 47 Indonesia | 35 | 19 | 54 | 23 ^e | 1 | (.) | 12 | 41 | 54 | |
| 48 Iran | .. | .. | 5 | 26 | 43 | 44 | 2 ^a | 50 | 58 | |
| 49 Libya | 100 | 90 | 60 | 60 | 60 | 62 | 7 ^a | 47 | 57 | |
| 50 Morocco | 100 | .. | 50* | 44 | 44 | .. | .. | 47 | 57 | |
| 51 Papua New Guinea | 55 | 10 | 51 | 25 | 25 | .. | .. | 41 | 51 | |
| 52 Tanzania | 85* | 41* | 84 | 58 | 56 | 82 | 35 | 42 | 52 | |
| 53 Tunisia | 100 | 17 | 65 | 36 | 37 | 65 | 2 ^a | 48 | 61 | |
| 54 Uganda | 35 ^b | .. | 18 | 9 | 8 | 22 | 20 | 41 | 48 | |
| 55 Viet Nam | .. | 32 | .. | .. | .. | .. | .. | 43 | 63 | |
| 56 Zambia | .. | 42 ^b | 42* | 71* | 21* | 72* | .. | 40 | 51 | |
| 57 Honduras | 50 | 40 | 42 | 36 | 37 | 35 ^h | 11 | 46 | 59 | |
| 58 Nicaragua | 91 | 10 | 50 | 18 | 18 | 15 | 31* | 47 | 57 | |
| 59 Peru | 68 | 15* | 56 | 17 | 17 | 23 ^h | 4 | 47 | 58 | |
| 60 South Africa | .. | .. | .. | .. | .. | .. | .. | 53 | 63 | |
| 61 Botswana | .. | .. | 91 | 70 | 45 | 63 | 32 | 40 | 57 | |
| 62 Brazil | 80 | 3* | 56* | 53 | 95* | 72 ^h | .. | 55 | 64 | |
| 63 Ecuador | 82 | 16 | 57 | 18 | 19 | 22 ^h | 4 | 51 | 62 | |
| 64 El Salvador | 67 | 40 | 55 | 52 ^e | 47 ^e | 58 | .. | 51 | 63 | |

| | | % of population with access to drinking water: 1980 | | % of one year old children fully immunized 1980 | | | | % of pregnant women fully immunized against tetanus 1980 | Life expectancy at birth (years) | |
|---|----------------------|---|-----------------|---|------------------|-----------------|-----------------|--|----------------------------------|------|
| | | urban | rural | TB | DPT | Polio | Measles | | 1960 | 1981 |
| 65 | Iraq | | 62 ^b | | 76 | 13 | 16 | 33 | | |
| 66 | Kenya | 85 | 15 | | | | | 4 ^a | 46 | 57 |
| 67 | Dominican Rep. | 85 | 33 | 34 | 27 | 42 | 17 ^h | | 41 | 56 |
| 68 | Guatemala | 89 | 21* | 30 | 58* | 58* | 45* | | 51 | 62 |
| 69 | Jordan | 100 | 65 | 0 | 44 | 44 | 11 | 2 ^a | 47 | 59 |
| 70 | Madagascar | | 25 ^b | 13 | 35 | 3 | | | 47 | 62 |
| 71 | Zimbabwe | | 10* | 64 | 39 | 38 | 56 | | 37 | 48 |
| 72 | Colombia | 100 | 79 | 57 | 20 | 22 | 26 | | 49 | 55 |
| 73 | Syrian Arab Rep. | 98 | 54 | 39 | 15 | 15 | 17 | 3 ^a | 53 | 63 |
| Middle infant mortality countries (IMR 26 to 50) | | 91 | 50 | 70 | 56 | 67 | 52 | | 60 | 69 |
| 74 | Mexico | 64 | 43 | 13 | 10 | 31 | 12 ^h | | 57 | 66 |
| 75 | Mongolia | | | 50 | 75 | 86 | 96 | | 52 | 64 |
| 76 | Philippines | 65 | 43 | 61 | 51 ^e | 44 | 22* | | 53 | 63 |
| 77 | Thailand | 65 | 63 | 77 | 56 ^e | 35 | 0 | 29 | 52 | 63 |
| 78 | United Arab Emirates | 95 | 81 | 15 | 11 | 11 | 34 | | 47 | 63 |
| 79 | Albania | | | 93 | 94 | 92 | 90 | | 62 | 70 |
| 80 | Paraguay | 39 | 10 | 25 | 28 | 26 | 25 | | 56 | 65 |
| 81 | Argentina | 65 | 16* | 59 | 45 | 89 | 65 | | 65 | 71 |
| 82 | Guyana | 100 | 60 | | 45 | 40 | | | 61 | 70 |
| 83 | Sri Lanka | 65 | 18 | 63 | 77 | 75 | 0 | 41 | 62 | 69 |
| 84 | Chile | 100 | 20* | 98 | 91 | 90 ^e | 89 | | 57 | 68 |
| 85 | China | | | | | | | | 41 | 67 |
| 86 | Lebanon | | | | | | | | 58 | 66 |
| 87 | Venezuela | 91 | 50 | | | | | | 57 | 68 |
| 88 | Uruguay | 96 | 13* | 83 | 62 | 67 ^e | 55 ^h | 11 | 68 | 71 |
| 89 | Mauritius | 100 | 98 | 98 | 97 | 97 | 33* | 1 | 59 | 65 |
| 90 | Korea, Dem. Rep. | | | | | | | | 54 | 66 |
| 91 | Korea, Rep. of | 86 | 61 | 42 | 61 | 62 | 5 ^h | | 54 | 66 |
| 92 | Kuwait | | 89 ^b | 0 | 54 | 76 | 66 | 30 ^a | 60 | 70 |
| 93 | Trinidad and Tobago | 100 | 93 | | 52 | 46 | | | 64 | 72 |
| 94 | Yugoslavia | | | 100 | 90 | 95 | 95 ^h | | 63 | 71 |
| 95 | Malaysia | 90 | 49 | 77 | 47 | 55 | | | 53 | 65 |
| 96 | Panama | 100 | 65 | 76 | 49 | 50 | 52 | | 62 | 71 |
| 97 | Romania | | | | | | | | 65 | 71 |
| 98 | Costa Rica | 100 | | 82 | 84 | 87 | 52 | | 62 | 73 |
| 99 | Jamaica | | 86 ^b | | 39 | 37 | | | 64 | 71 |
| 100 | Portugal | | 65 ^b | | 90 | 85 | 70 ^h | | 63 | 72 |
| 101 | USSR | | | | 95 | 95 | 95 ^h | | 68 | 72 |
| Low infant mortality countries (IMR 25 and less) | | | | 90 | 85 | 92 | 70 | | 70 | 74 |
| 102 | Hungary | | | 100 | 100 | 98 | 99 ^h | | 68 | 71 |
| 103 | Poland | | | 95 | 95 | 95 | 65 | | 67 | 73 |
| 104 | Bulgaria | | | 97 | 97 | 98 | 98 | 98 | 69 | 73 |
| 105 | Cuba | | | 99 | 100 | | 56 | | 63 | 73 |
| 106 | Greece | | | 12 | 31 | 95 | | | 69 | 74 |
| 107 | Czechoslovakia | | | 95 | 95 | 95 | 95 ^h | | 70 | 72 |
| 108 | Israel | | | 65 | 73 | 73 | 69 | | 69 | 73 |
| 109 | Italy | | | 90 | 90 | 90 | 90 ^h | | 69 | 73 |
| 110 | Austria | | | | 95 | 99 | 50 | | 70 | 73 |
| 111 | Belgium | | | | 33 | 65 | | | | |
| 112 | German Dem. Rep. | | | 95 | 80 | 90 | 95 | | 69 | 73 |
| 113 | Germany, Fed. Rep. | | | 40 | 50 | 80 | 35 ^h | | 70 | 73 |
| 114 | New Zealand | | | | | | 80 ^h | | 72 | 74 |
| 115 | USA | | | | | | 96 ^h | | 70 | 75 |
| 116 | Ireland | | | | | | | | 70 | 73 |
| 117 | Singapore | 100 | | 85 | 81 | 88 | 58 ^h | | 64 | 72 |
| 118 | United Kingdom | | | | 35 | 79 | 50 ^h | | 71 | 74 |
| 119 | Australia | | | 33 | 17 | | | | 71 | 75 |
| 120 | Canada | | | 80 | 79 | 80 | | | 70 | 76 |
| 121 | France | | | | | | | | | |
| 122 | Hong Kong | 100 | 95 | 100 | 84 | 94 | | | 67 | 75 |
| 123 | Spain | | | | 85 | 97 | | | 68 | 74 |
| 124 | Denmark | | | | 95 | 95 | 91 ^h | | 72 | 75 |
| 125 | Netherlands | | | | | | | | 73 | 76 |
| 126 | Norway | | | | | | | | 73 | 76 |
| 127 | Switzerland | | | 90 | 92 | 90 | 70 ^h | | 68 | 75 |
| 128 | Finland | | | 85 | | | 69 ^h | | 68 | 77 |
| 129 | Japan | | | | 100 ⁱ | 100 | 56 ^h | | 73 | 77 |
| 130 | Sweden | | | | | | | | | |

TABLE 4: EDUCATION

| | Adult literacy rate | | | | Primary school enrolment ratio | | | | Secondary school enrolment ratio | |
|--|---------------------|----------------|-----------------|-----------------|--------------------------------|----------------|-------------------|---------------------|----------------------------------|---------------------|
| | male | 1970 female | male | 1980 female | male | 1960 female | 1979-1981 male | 1979-1981 female | 1979-1981 male | 1979-1981 female |
| Very high infant mortality countries (IMR over 100) | 28 | 9 | 42 | 19 | 41 | 16 | 81 | 49 | 16 | 8 |
| 1 Upper Volta | 13 | 3 | 18 | 5 | 12 | 5 | 24 | 14 | 4 | 2 |
| 2 Afghanistan | 13 | 2 | 26 | 6 | 15 | 2 | 49 | 11 | 12 | 4 |
| 3 Sierra Leone | 18 | 8 | 31 | 17 | 30 | 15 | 45 ^a | 30 ^a | 16 ^e | 8 ^b |
| 4 Kampuchea | 71 | 23 | 78 | 39 | 82 | 46 | 48 ^b | 35 ^b | 13 ^b | 6 ^b |
| 5 Yemen Arab Rep. | 9 | 1 | 18 | 2 | (.) | 82 | 12 | 9 | 2 | |
| 6 Malawi | 42 | 18 | 48 | 25 | 81 | 45 | 70 | 49 | 6 | 2 |
| 7 Guinea | 21 | 7 | 35 | 14 | 44 | 16 | 44 | 22 | 23 | 9 |
| 8 Angola | 16 | 7 | 36 | 19 | 28 | 13 | 85 ^b | 48 ^b | 10 ^b | 8 ^b |
| 9 Benin | 23 | 8 | 40 | 17 | 38 | 15 | 84 | 39 | 23 | 8 |
| 10 Bhutan | . | . | . | . | 5 | (.) | 15 | 7 | 2 | 1 |
| 11 Central African Rep. | 26 | 6 | 48 | 19 | 53 | 12 | 89 | 49 | 20 | 7 |
| 12 Chad | 20 | 2 | 35 | 8 | 29 | 4 | 51 ^c | 19 ^c | 6 ^c | 1 ^c |
| 13 Ethiopia | 9 | 4 | 11 ^d | 5 ^d | 11 | 3 | 56 | 30 | 14 | 8 |
| 14 Guinea-Bissau | 13 | 6 | 25 | 13 | 35 | 15 | 130 | 59 | 13 | 3 |
| 15 Liberia | 27 | 8 | 42 | 18 | 45 | 18 | 82 | 50 | 29 | 11 |
| 16 Mali | 11 | 4 | 19 | 8 | 14 | 6 | 35 ^e | 20 ^e | 13 ^a | 5 ^a |
| 17 Nepal | 23 | 3 | 34 | 6 | 19 | 1 | 126 | 53 | 33 | 9 |
| 18 Somalia | 5 | 1 | 11 | 3 | 13 | 5 | 38 | 21 | 16 | 6 |
| 19 Mauritania | . | . | . | . | 13 | 3 | 43 | 23 | 16 | 4 |
| 20 Niger | 6 | 2 | 14 | 6 | 7 | 3 | 29 ^e | 17 ^e | 5 ^e | 2 ^e |
| 21 Rwanda | 43 | 21 | 61 | 39 | 68 | 30 | 74 | 67 | 2 | 1 |
| 22 Senegal | 18 | 5 | 31 | 14 | 36 | 17 | 58 | 38 | 14 | 6 |
| 23 Yemen, PDR | 31 | 9 | 48 | 16 | 20 | 5 | 93 ^a | 51 ^a | 42 ^a | 15 ^a |
| 24 Bangladesh | 36 | 12 | 43 | 20 | 66 | 26 | 76 | 47 | 24 | 6 |
| 25 Bolivia | 68 | 46 | 79 | 58 | 78 | 50 | 90 | 78 | 41 | 31 |
| 26 Congo | 50 | 19 | 70 | 44 | . | . | . | . | . | . |
| 27 Lao, PDR | 37 | 28 | 51 | 36 | 34 | 16 | 105 | 89 | 22 | 14 |
| 28 Nigeria | 35 | 14 | 46 | 23 | 46 | 27 | 94 ^a | 70 ^a | 13 ^e | 7 ^e |
| 29 Oman | . | . | . | . | . | . | 81 | 43 | 20 | 7 |
| 30 Burundi | 29 | 10 | 39 | 15 | 27 | 9 | 34 | 22 | 4 | 2 |
| 31 Egypt | 50 | 20 | 56 | 28 | 80 | 52 | 89 | 63 | 64 | 39 |
| 32 India | 47 | 20 | 55 | 29 | 80 | 40 | 86 | 57 | 40 | 20 |
| 33 Ivory Coast | 26 | 10 | 45 | 24 | 68 | 24 | 92 | 60 | 25 | 8 |
| 34 Pakistan | 30 | 11 | 39 | 18 | 46 | 13 | 73 | 30 | 22 | 8 |
| 35 Sudan | 28 | 6 | 38 | 14 | 35 | 14 | 60 | 43 | 20 | 12 |
| 36 Turkey | 69 | 35 | 80 | 50 | 90 | 58 | 110 | 93 | 49 | 24 |
| 37 Algeria | 39 | 11 | 60 | 24 | 55 | 37 | 106 | 81 | 40 | 26 |
| 38 Cameroon | 47 | 19 | 62 | 36 | 87 | 43 | 117 | 97 | 25 | 13 |
| 39 Haiti | 26 | 17 | 34 | 24 | 50 | 42 | 75 | 64 | 14 | 12 |
| 40 Lesotho | 49 | 74 | 58 | 81 | 63 | 102 | 84 | 123 | 13 | 20 |
| 41 Mozambique | 29 | 14 | 44 | 23 | 60 | 36 | 102 | 78 | 9 | 4 |
| 42 Saudi Arabia | 15 | 2 | 35 | 12 | 22 | 2 | 77 | 51 | 37 | 24 |
| 43 Togo | 30 | 8 | 46 | 20 | 63 | 24 | 144 | 89 | 51 | 16 |
| 44 Zaire | 61 | 22 | 74 | 37 | 88 | 32 | 104 ^e | 75 ^e | 33 ^e | 13 ^e |
| High infant mortality countries (IMR 60 to 100) | 58 | 37 | 68 | 55 | 68 | 45 | 105 | 97 | 29 | 23 |
| 45 Burma | . | . | . | . | 61 | 52 | 87 ^a | 81 ^a | 22 ^a | 18 ^a |
| 46 Ghana | 45 | 20 | 59 | 37 | 52 | 25 | 77 | 60 | 44 | 27 |
| 47 Indonesia | 66 | 42 | 77 | 58 | 86 | 58 | 119 | 104 | 33 | 22 |
| 48 Iran | 40 | 17 | 55 | 30 | 56 | 27 | 121 ^a | 80 ^a | 55 ^a | 32 ^a |
| 49 Libya | 60 | 13 | 76 | 36 | 92 | 24 | . | . | . | . |
| 50 Morocco | 33 | 11 | 41 | 18 | 67 | 27 | 95 | 58 | 29 | 18 |
| 51 Papua New Guinea | 32 | 19 | 48 | 30 | 59 | 7 | 70 | 54 | 16 | 7 |
| 52 Tanzania | 48 | 18 | 53 ^d | 23 ^d | 33 | 18 | 110 | 98 | 5 | 2 |
| 53 Tunisia | 44 | 17 | 61 | 34 | 88 | 43 | 119 | 92 | 37 | 23 |
| 54 Uganda | 52 | 30 | 65 | 41 | 65 | 32 | 58 | 42 | 7 | 3 |
| 55 Viet Nam | . | . | . | . | . | . | 120 | 105 | 53 | 43 |
| 56 Zambia | 66 | 37 | 79 | 58 | 51 | 34 | 101 | 89 | 22 | 11 |
| 57 Honduras | 55 | 50 | 64 | 62 | 68 | 67 | 96 | 95 | 29 | 30 |
| 58 Nicaragua | 58 | 56 | 61 ^d | 60 ^d | 65 | 66 | 97 | 103 | 40 | 47 |
| 59 Peru | 81 | 60 | 89 | 73 | 95 | 71 | 116 | 108 | 62 | 52 |
| 60 South Africa | 70 | 71 | 81 | 81 | 94 | 85 | 105 ^b | 105 ^b | 20 ^b | 19 ^b |
| 61 Botswana | 41 | 43 | 61 | 61 | 35 | 48 | 92 | 111 | 20 | 23 |
| 62 Brazil | 69 | 63 | 76 | 73 | 97 | 93 | 93 | 93 | 29 ^e | 35 ^e |
| 63 Ecuador | 75 | 68 | 82 | 76 | 87 | 79 | 109 | 105 | 39 | 42 |
| 64 El Salvador | 61 | 53 | 70 | 63 | 82 | 77 | 74 | 74 | 24 | 23 |

| | | Adult literacy rate | | | | Primary school enrolment ratio | | | | Secondary school enrolment ratio 1979-1981 | |
|---|----------------------|---------------------|-----------|-----------|-----------|--------------------------------|-----------------|------------------|------------------|--|------------------|
| | | 1970 | | 1980 | | 1960 | | 1979-1981 | | male | female |
| | | male | female | male | female | male | female | male | female | male | female |
| 65 | Iraq | 50 | 18 | 68 | 32 | 94 | 36 | 122 | 110 | 76 | 38 |
| 66 | Kenya | 44 | 19 | 60 | 35 | 64 | 30 | 116 | 103 | 23 | 15 |
| 67 | Dominican Rep. | 69 | 66 | 75 | 73 | 99 | 98 | 105 | 107 | 32 ^e | 33 ^e |
| 68 | Guatemala | 51 | 37 | 59 | 44 | 50 | 39 | 74 | 63 | 17 | 15 |
| 69 | Jordan | 64 | 29 | 78 | 53 | 94 | 59 | 105 ^h | 102 ^h | 79 ^h | 73 ^h |
| 70 | Madagascar | 56 | 43 | 68 | 55 | 58 | 45 | 100 ^d | 87 ^d | 13 ^d | 10 ^d |
| 71 | Zimbabwe | 63 | 47 | 77 | 61 | .. | .. | 118 | 113 | 18 | 13 |
| 72 | Colombia | 79 | 76 | 86 | 84 | 77 | 77 | 127 | 130 | 43 | 49 |
| 73 | Syrian Arab Rep. | 59 | 21 | 72 | 35 | 89 | 39 | 112 | 87 | 57 | 35 |
| Middle infant mortality countries (IMR 26 to 50) | | 85 | 75 | 90 | 85 | 100 | 94 | 107 | 104 | 54 | 59 |
| 74 | Mexico | 78 | 69 | 86 | 80 | 82 | 77 | 121 | 115 | 54 | 49 |
| 75 | Mongolia | 87 | 74 | 93 | 86 | 79 | 78 | 107 | 102 | 85 | 92 |
| 76 | Philippines | 83 | 80 | 90 | 88 | 98 | 93 | 111 | 108 | 58 | 68 |
| 77 | Thailand | 86 | 72 | 93 | 83 | 88 | 79 | 85 ^a | 80 ^a | 30 ^e | 26 ^e |
| 78 | United Arab Emirates | 24 | 7 | 30 | 19 | .. | .. | 117 | 115 | 49 | 57 |
| 79 | Albania | .. | .. | .. | .. | 102 | 86 | 109 | 103 | 70 | 60 |
| 80 | Paraguay | 84 | 75 | 90 | 83 | 105 | 90 | 106 | 98 | 26 | 26 |
| 81 | Argentina | 94 | 92 | 95 | 94 | 98 | 99 | 116 | 116 | 52 | 60 |
| 82 | Guyana | 94 | 88 | 96 | 93 | 107 | 106 | 96 | 95 | 58 | 61 |
| 83 | Sri Lanka | 85 | 69 | 87 | 76 | 100 | 90 | 106 | 100 | 49 | 54 |
| 84 | Chile | 90 | 86 | 94 | 91 | 111 | 107 | 118 | 116 | 51 | 59 |
| 85 | China | .. | .. | .. | .. | .. | .. | 132 | 110 | 52 | 35 |
| 86 | Lebanon | 74 | 52 | 83 | 64 | 105 | 99 | 123 | 114 | 60 | 56 |
| 87 | Venezuela | 79 | 71 | 84 | 78 | 100 | 100 | 104 | 104 | 35 | 42 |
| 88 | Uruguay | 93 | 93 | 95 | 95 | 111 | 111 | 107 | 104 | 56 | 65 |
| 89 | Mauritius | 77 | 59 | 86 | 72 | 103 | 93 | 103 | 102 | .. | 50 |
| 90 | Korea, Dem. Rep. | .. | .. | .. | .. | .. | .. | 118 ^c | 114 ^c | .. | .. |
| 91 | Korea, Rep. of | 92 | 78 | 96 | 88 | 99 | 89 | 108 | 105 | 89 | 80 |
| 92 | Kuwait | 65 | 42 | 72 | 54 | 131 | 102 | 98 | 93 | 80 | 70 |
| 93 | Trinidad and Tobago | 95 | 89 | 97 | 94 | 89 | 87 | 93 ^a | 95 ^a | 55 ^c | 57 ^c |
| 94 | Yugoslavia | 89 | 74 | 93 | 81 | 113 | 108 | 100 | 98 | 86 | 80 |
| 95 | Malaysia | 71 | 48 | 79 | 61 | 108 | 83 | 94 | 91 | 54 | 51 |
| 96 | Panama | 81 | 81 | 87 | 86 | 98 | 94 | 115 | 111 | 61 | 69 |
| 97 | Romania | 96 | 91 | 97 | 94 | 101 | 95 | 101 | 101 | 74 | 70 |
| 98 | Costa Rica | 88 | 87 | 92 | 92 | 97 | 95 | 109 | 106 | 44 | 51 |
| 99 | Jamaica | 84 | 89 | 90 | 93 | 92 | 93 | 98 | 100 | 54 | 60 |
| 100 | Portugal | 76 | 66 | 85 | 76 | 132 | 129 | 120 ^e | 116 ^e | 54 ^a | 56 ^a |
| 101 | USSR | 98 | 97 | 99 | 98 | 100 | 100 | 97 ^d | 97 ^d | 93 ^d | 119 ^d |
| Low infant mortality countries (IMR 25 and less) | | 95 | 91 | 96 | 94 | 105 | 103 | 100 | 101 | 82 | 84 |
| 102 | Hungary | 98 | 98 | 99 | 98 | 103 | 100 | 97 | 97 | 33 | 47 |
| 103 | Poland | 98 | 97 | 99 | 98 | 110 | 107 | 100 | 99 | 75 | 80 |
| 104 | Bulgaria | 94 | 89 | 96 | 93 | 94 | 92 | 97 | 96 | 86 | 85 |
| 105 | Cuba | 86 | 87 | 91 | 91 | 109 | 109 | 113 | 105 | 73 | 80 |
| 106 | Greece | 90 | 76 | 94 | 83 | 104 | 101 | 103 | 102 | 86 | 76 |
| 107 | Czechoslovakia | .. | .. | .. | .. | 93 | 93 | 91 | 92 | 33 | 56 |
| 108 | Israel | 92 | 85 | 96 | 91 | 99 | 97 | 94 | 96 | 67 | 78 |
| 109 | Italy | 95 | 93 | 96 | 95 | 112 | 109 | 102 | 101 | 75 | 71 |
| 110 | Austria | .. | .. | .. | .. | 106 | 104 | 100 | 99 | 73 | 76 |
| 111 | Belgium | 99 | 99 | 99 | 99 | 111 | 108 | 101 | 101 | 88 | 89 |
| 112 | German Dem. Rep. | .. | .. | .. | .. | 111 | 113 | 95 | 97 | 91 | 84 |
| 113 | Germany, Fed. Rep. | .. | .. | .. | 99 | 110 | 106 | 103 | 101 | 80 | 82 |
| 114 | New Zealand | .. | .. | .. | 99 | .. | .. | .. | .. | .. | .. |
| 115 | USA | 99 | 99 | 99 | 99 | 107 | 112 | 101 | 102 | 88 | 98 |
| 116 | Ireland | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 117 | Singapore | 82 | 55 | 88 | 70 | 121 | 101 | 108 | 105 | 53 | 58 |
| 118 | United Kingdom | .. | .. | .. | 99 | 92 | 92 | 104 | 105 | 81 | 84 |
| 119 | Australia | .. | .. | 100 | .. | 103 | 103 | 110 | 110 | 85 | 88 |
| 120 | Canada | .. | .. | .. | 99 | 108 | 105 | 100 | 100 | 88 | 90 |
| 121 | France | 99 | 98 | 99 | 99 | 144 | 143 | 112 | 111 | 81 | 89 |
| 122 | Hong Kong | 90 | 64 | 94 | 77 | 93 | 79 | 111 | 107 | 60 | 65 |
| 123 | Spain | 93 | 87 | 96 | 91 | 106 | 116 | 109 | 109 | 84 | 87 |
| 124 | Denmark | .. | .. | .. | 99 | 103 | 103 | 97 | 97 | 106 | 105 |
| 125 | Netherlands | .. | .. | .. | 99 | 105 | 104 | 100 | 102 | 96 | 91 |
| 126 | Norway | .. | .. | .. | 99 | 100 | 100 | 99 | 100 | 92 | 95 |
| 127 | Switzerland | .. | .. | .. | 99 | 118 | 86 ^e | 86 ^e | 87 ^e | 52 ^e | 57 ^e |
| 128 | Finland | .. | .. | 100 | .. | 100 | 95 | 83 | 83 | 85 | 95 |
| 129 | Japan | 99 | 99 | 99 | 99 | 103 | 102 | 101 | 101 | 91 | 92 |
| 130 | Sweden | .. | .. | .. | 99 | 95 | 96 | 97 | 97 | 82 | 90 |

TABLE 5: DEMOGRAPHIC INDICATORS

| | Infant mortality rate aged 0-1 | | Child death rate aged 1-4 | | Crude death rate | | Crude birth rate | | Total fertility rate 1981 | Population annual growth rate 1970-1981 |
|--|--------------------------------|------|---------------------------|------|------------------|------|------------------|------|---------------------------|---|
| | 1960 | 1981 | 1960 | 1981 | 1960 | 1981 | 1960 | 1981 | | |
| Very high infant mortality countries (IMR over 100) | 180 | 140 | 41 | 26 | 27 | 19 | 48 | 46 | 6.5 | 2.6 |
| 1 Upper Volta | 250 | 210 | 63 | 50 | 27 | 22 | 49 | 48 | 6.5 | 2.0 |
| 2 Afghanistan | 230 | 200 | 41 | 35 | 31 | 26 | 50 | 47 | 6.9 | 2.5 |
| 3 Sierra Leone | 230 | 200 | 57 | 49 | 27 | 18 | 47 | 46 | 6.1 | 2.6 |
| 4 Kampuchea | 150 | 190 | 22 | 19 | 23 | 23 | 45 | 41 | 4.8 | -0.3 ^a |
| 5 Yemen Arab Rep. | 210 | 190 | 60 | 50 | 29 | 23 | 50 | 48 | 6.8 | 3.0 |
| 6 Malawi | 210 | 170 | 49 | 38 | 27 | 23 | 56 | 56 | 7.8 | 3.0 |
| 7 Guinea | 210 | 160 | 50 | 36 | 30 | 22 | 47 | 47 | 6.3 | 2.9 |
| 8 Angola | 210 | 150 | 50 | 33 | 31 | 23 | 50 | 49 | 6.5 | 2.5 |
| 9 Benin | 210 | 150 | 49 | 33 | 27 | 17 | 51 | 49 | 6.5 | 2.7 |
| 10 Bhutan | 200 | 150 | 33 | 22 | 26 | 19 | 43 | 40 | 5.7 | 2.0 |
| 11 Central African Rep. | 200 | 150 | 46 | 32 | 28 | 22 | 43 | 43 | 5.5 | 2.3 |
| 12 Chad | 200 | 150 | 46 | 32 | 29 | 22 | 45 | 43 | 5.5 | 2.0 |
| 13 Ethiopia | 180 | 150 | 40 | 31 | 28 | 24 | 51 | 48 | 6.5 | 2.0 |
| 14 Guinea-Bissau | 190 | 150 | 49 | 33 | 32 | 22 | 41 | 41 | 5.4 | 1.6 ^a |
| 15 Liberia | 190 | 150 | 46 | 33 | 21 | 14 | 50 | 50 | 6.9 | 3.5 |
| 16 Mali | 200 | 150 | 46 | 33 | 27 | 21 | 50 | 49 | 6.5 | 2.6 |
| 17 Nepal | 200 | 150 | 33 | 22 | 26 | 20 | 44 | 44 | 6.4 | 2.6 |
| 18 Somalia | 180 | 150 | 40 | 31 | 29 | 25 | 48 | 48 | 6.5 | 2.8 |
| 19 Mauritania | 190 | 140 | 43 | 30 | 27 | 20 | 51 | 44 | 6.0 | 2.3 |
| 20 Niger | 190 | 140 | 45 | 31 | 27 | 21 | 52 | 51 | 7.0 | 3.3 |
| 21 Rwanda | 150 | 140 | 32 | 29 | 27 | 20 | 53 | 54 | 8.3 | 3.4 |
| 22 Senegal | 180 | 140 | 42 | 31 | 26 | 21 | 48 | 48 | 6.5 | 2.7 |
| 23 Yemen, PDR | 210 | 140 | 59 | 29 | 29 | 20 | 50 | 48 | 7.0 | 2.5 |
| 24 Bangladesh | 160 | 130 | 25 | 20 | 28 | 18 | 54 | 47 | 6.4 | 2.6 |
| 25 Bolivia | 170 | 130 | 40 | 23 | 22 | 16 | 46 | 42 | 6.0 | 2.6 |
| 26 Congo | 170 | 130 | 39 | 26 | 18 | 10 | 40 | 43 | 6.0 | 2.9 |
| 27 Lao, PDR | 160 | 130 | 24 | 18 | 23 | 21 | 44 | 43 | 6.4 | 1.9 |
| 28 Nigeria | 180 | 130 | 42 | 28 | 25 | 17 | 52 | 50 | 6.9 | 2.5 |
| 29 Oman | 190 | 130 | . | . | 28 | 17 | 51 | 48 | 7.1 | 3.1 ^a |
| 30 Burundi | 150 | 120 | 33 | 24 | 27 | 20 | 47 | 46 | 6.5 | 2.2 |
| 31 Egypt | 170 | 120 | 34 | 16 | 19 | 12 | 44 | 36 | 4.8 | 2.5 |
| 32 India | 170 | 120 | 26 | 17 | 22 | 13 | 44 | 35 | 4.8 | 2.1 |
| 33 Ivory Coast | 170 | 120 | 39 | 25 | 27 | 18 | 49 | 46 | 6.8 | 5.0 |
| 34 Pakistan | 160 | 120 | 25 | 17 | 24 | 16 | 51 | 46 | 6.4 | 3.0 |
| 35 Sudan | 170 | 120 | 40 | 21 | 25 | 18 | 47 | 47 | 6.7 | 3.1 |
| 36 Turkey | 190 | 120 | 50 | 20 | 16 | 9 | 43 | 33 | 4.6 | 2.3 |
| 37 Algeria | 170 | 110 | 39 | 18 | 23 | 13 | 50 | 45 | 7.3 | 3.3 |
| 38 Cameroon | 160 | 110 | 36 | 20 | 27 | 17 | 43 | 43 | 5.8 | 2.2 |
| 39 Haiti | 180 | 110 | 47 | 17 | 19 | 13 | 39 | 33 | 4.7 | 1.7 |
| 40 Lesotho | 140 | 110 | 31 | 22 | 23 | 15 | 42 | 42 | 5.8 | 2.4 |
| 41 Mozambique | 160 | 110 | 36 | 22 | 26 | 17 | 46 | 44 | 6.5 | 4.2 |
| 42 Saudi Arabia | 190 | 110 | 48 | 17 | 23 | 13 | 49 | 45 | 7.3 | 4.5 |
| 43 Togo | 180 | 110 | 42 | 20 | 23 | 18 | 51 | 49 | 6.5 | 2.5 |
| 44 Zaire | 150 | 110 | 33 | 21 | 24 | 16 | 48 | 46 | 6.3 | 3.0 |
| High infant mortality countries (IMR 60 to 100) | 140 | 90 | 27 | 11 | 20 | 11 | 48 | 44 | 6.1 | 3.0 |
| 45 Burma | 160 | 100 | 25 | 12 | 21 | 13 | 43 | 37 | 5.2 | 2.2 |
| 46 Ghana | 140 | 100 | 31 | 19 | 20 | 13 | 50 | 49 | 7.0 | 3.0 |
| 47 Indonesia | 150 | 100 | 23 | 14 | 22 | 13 | 46 | 35 | 4.4 | 2.3 |
| 48 Iran | 160 | 100 | 26 | 14 | 17 | 11 | 46 | 43 | 6.0 | 3.1 |
| 49 Libya | 160 | 100 | 36 | 12 | 19 | 12 | 49 | 47 | 7.4 | 4.1 |
| 50 Morocco | 160 | 100 | 37 | 15 | 23 | 13 | 52 | 46 | 6.9 | 3.1 |
| 51 Papua New Guinea | 170 | 100 | 26 | 13 | 23 | 15 | 44 | 36 | 5.2 | 2.1 |
| 52 Tanzania | 150 | 100 | 33 | 19 | 22 | 15 | 47 | 47 | 6.5 | 3.4 |
| 53 Tunisia | 110 | 100 | 36 | 9 | 21 | 9 | 49 | 34 | 5.1 | 2.3 |
| 54 Uganda | 140 | 100 | 29 | 17 | 23 | 18 | 50 | 50 | 7.0 | 2.6 |
| 55 Viet Nam | 160 | 100 | 25 | 12 | 21 | 8 | 47 | 35 | 5.1 | 2.8 |
| 56 Zambia | 150 | 100 | 33 | 20 | 24 | 16 | 51 | 49 | 6.9 | 3.1 |
| 57 Honduras | 150 | 90 | 30 | 9 | 19 | 11 | 51 | 44 | 6.6 | 3.4 |
| 58 Nicaragua | 140 | 90 | 30 | 10 | 19 | 11 | 51 | 44 | 6.1 | 3.9 |
| 59 Peru | 160 | 90 | 38 | 9 | 18 | 11 | 46 | 36 | 5.1 | 2.6 |
| 60 South Africa | 140 | 90 | 28 | 17 | 15 | 9 | 39 | 39 | 5.1 | 2.8 |
| 61 Botswana | 120 | 80 | . | . | 25 | 13 | 50 | 50 | 6.5 | 2.6 ^a |
| 62 Brazil | 120 | 80 | 19 | 7 | 13 | 8 | 43 | 30 | 6.5 | 2.1 |
| 63 Ecuador | 140 | 80 | 28 | 8 | 17 | 9 | 47 | 40 | 5.9 | 3.4 |
| 64 El Salvador | 140 | 80 | 26 | 7 | 16 | 8 | 49 | 40 | 5.6 | 2.9 |

| | Infant mortality rate aged 0-1 | | Child death rate aged 1-4 | | Crude death rate | | Crude birth rate | | Total fertility rate 1981 | Population annual growth rate 1970-1981 |
|---|--------------------------------|-----------|---------------------------|------------|------------------|----------|------------------|-----------|---------------------------|---|
| | 1960 | 1981 | 1960 | 1981 | 1960 | 1981 | 1960 | 1981 | | |
| 65 Iraq | 140 | 80 | 28 | 7 | 20 | 12 | 49 | 47 | 7.0 | 3.4 |
| 66 Kenya | 140 | 80 | 29 | 15 | 24 | 13 | 55 | 55 | 8.0 | 4.0 |
| 67 Dominican Rep. | 120 | 70 | 20 | 5 | 16 | 8 | 50 | 36 | 4.6 | 3.0 |
| 68 Guatemala | 90 | 70 | 10 | 5 | 18 | 10 | 48 | 39 | 5.3 | 3.1 |
| 69 Jordan | 140 | 70 | 26 | 5 | 20 | 9 | 47 | 46 | 7.3 | 3.5 |
| 70 Madagascar | 110 | 70 | 21 | 11 | 27 | 18 | 47 | 47 | 6.5 | 2.6 |
| 71 Zimbabwe | 120 | 70 | 23 | 11 | 17 | 13 | 55 | 54 | 8.0 | 3.2 |
| 72 Colombia | 100 | 60 | 14 | 4 | 16 | 8 | 46 | 29 | 3.7 | 1.9 |
| 73 Syrian Arab Rep. | 130 | 60 | 25 | 4 | 18 | 8 | 47 | 47 | 7.4 | 3.7 |
| Middle infant mortality countries (IMR 26 to 50) | 80 | 40 | 9 | 2 | 11 | 7 | 42 | 29 | 3.7 | 2.0 |
| 74 Mexico | 90 | 50 | 10 | 4 | 12 | 7 | 45 | 36 | 5.0 | 3.1 |
| 75 Mongolia | 110 | 50 | 14 | 4 | 15 | 7 | 41 | 34 | 4.9 | 2.9 |
| 76 Philippines | 110 | 50 | 14 | 4 | 15 | 7 | 47 | 34 | 4.6 | 2.7 |
| 77 Thailand | 100 | 50 | 13 | 4 | 15 | 8 | 44 | 30 | 3.9 | 2.5 |
| 78 United Arab Emirates | 140 | 50 | 26 | 3 | 19 | 7 | 46 | 30 | 6.8 | 16.6 |
| 79 Albania | 80 | 46 | 9 | . | 10 | 6 | 43 | 29 | 3.8 | 2.5 |
| 80 Paraguay | 90 | 46 | 9 | 2 | 13 | 7 | 43 | 32 | 4.3 | 2.6 |
| 81 Argentina | 60 | 44 | 4 | 2 | 9 | 9 | 24 | 20 | 2.8 | 1.6 |
| 82 Guyana | 70 | 43 | . | . | 10 | 6 | 46 | 29 | 3.5 | 2.2 ^a |
| 83 Sri Lanka | 70 | 43 | 7 | 3 | 9 | 6 | 36 | 27 | 3.5 | 1.7 |
| 84 Chile | 110 | 42 | 18 | 2 | 12 | 7 | 37 | 25 | 3.0 | 1.7 |
| 85 China | 170 | 41 | 26 | 7 | 24 | 8 | 39 | 21 | 2.9 | 1.5 |
| 86 Lebanon | 70 | 40 | 5 | 2 | 14 | 8 | 43 | 30 | 4.0 | 0.6 |
| 87 Venezuela | 90 | 40 | 9 | 2 | 11 | 6 | 46 | 35 | 4.4 | 3.4 |
| 88 Uruguay | 50 | 39 | 3 | 2 | 10 | 10 | 22 | 20 | 2.8 | 0.4 |
| 89 Mauritius | 70 | 34 | . | . | 9 | 6 | 41 | 26 | 2.9 | 1.4 ^a |
| 90 Korea, Dem. Rep. | 80 | 33 | 9 | 2 | 13 | 6 | 42 | 31 | 4.2 | 2.6 |
| 91 Korea, Rep. of | 80 | 33 | 9 | 2 | 13 | 7 | 43 | 24 | 3.0 | 1.7 |
| 92 Kuwait | 90 | 33 | 10 | 1 | 10 | 4 | 44 | 38 | 5.9 | 6.3 |
| 93 Trinidad and Tobago | 50 | 31 | 4 | 1 | 8 | 8 | 38 | 29 | 2.5 | 1.4 |
| Low infant mortality countries (IMR 25 and less) | 31 | 12 | 2 | (.) | 9 | 9 | 18 | 14 | 1.9 | 0.7 |
| 102 Hungary | 48 | 21 | 2 | 1 | 10 | 14 | 15 | 13 | 1.9 | 0.4 |
| 103 Poland | 60 | 21 | 5 | 1 | 8 | 9 | 23 | 19 | 2.2 | 0.9 |
| 104 Bulgaria | 45 | 20 | 3 | 1 | 8 | 11 | 18 | 14 | 2.1 | 0.5 |
| 105 Cuba | 70 | 19 | 5 | 1 | 9 | 6 | 32 | 18 | 2.2 | 1.1 |
| 106 Greece | 40 | 18 | 3 | 1 | 7 | 9 | 19 | 15 | 2.3 | 0.9 |
| 107 Czechoslovakia | 24 | 17 | 1 | 1 | 9 | 12 | 16 | 16 | 2.4 | 0.7 |
| 108 Israel | 31 | 16 | 2 | 1 | 6 | 7 | 27 | 25 | 3.3 | 2.6 |
| 109 Italy | 44 | 14 | 3 | 1 | 10 | 10 | 18 | 11 | 1.9 | 0.4 |
| 110 Austria | 38 | 13 | 3 | 1 | 13 | 12 | 18 | 13 | 1.6 | 0.1 |
| 111 Belgium | 31 | 12 | 2 | (.) | 12 | 11 | 17 | 13 | 1.7 | 0.2 |
| 112 German Dem. Rep. | 39 | 12 | 3 | (.) | 14 | 14 | 17 | 14 | 1.4 | -0.2 |
| 113 Germany, Fed. Rep. | 34 | 12 | 2 | 1 | 12 | 12 | 18 | 10 | 1.4 | 0.0 |
| 114 New Zealand | 23 | 12 | 1 | (.) | 9 | 8 | 27 | 16 | 2.1 | 1.5 |
| 115 USA | 26 | 12 | 1 | (.) | 10 | 9 | 24 | 16 | 1.8 | 1.0 |
| 116 Ireland | 29 | 11 | 2 | (.) | 12 | 9 | 21 | 21 | 3.2 | 1.3 |
| 117 Singapore | 36 | 11 | 2 | (.) | 8 | 5 | 38 | 18 | 1.7 | 1.5 |
| 118 United Kingdom | 23 | 11 | 1 | (.) | 12 | 12 | 18 | 13 | 1.7 | 0.1 |
| 119 Australia | 20 | 10 | 1 | (.) | 9 | 7 | 22 | 16 | 1.9 | 1.4 |
| 120 Canada | 27 | 10 | 2 | (.) | 8 | 7 | 27 | 16 | 1.9 | 1.2 |
| 121 France | 27 | 10 | 2 | (.) | 11 | 10 | 18 | 15 | 1.9 | 0.5 |
| 122 Hong Kong | 37 | 10 | 2 | (.) | 8 | 5 | 35 | 19 | 2.2 | 2.4 |
| 123 Spain | 50 | 10 | 4 | (.) | 9 | 8 | 22 | 14 | 2.5 | 1.1 |
| 124 Denmark | 22 | 8 | 1 | (.) | 10 | 11 | 17 | 10 | 1.6 | 0.3 |
| 125 Netherlands | 18 | 8 | 1 | (.) | 8 | 8 | 21 | 13 | 1.6 | 0.8 |
| 126 Norway | 19 | 8 | 1 | (.) | 9 | 10 | 17 | 13 | 1.8 | 0.5 |
| 127 Switzerland | 21 | 8 | 1 | (.) | 10 | 9 | 18 | 12 | 1.5 | 0.1 |
| 128 Finland | 21 | 7 | 1 | (.) | 9 | 9 | 19 | 13 | 1.6 | 0.4 |
| 129 Japan | 30 | 7 | 2 | (.) | 8 | 6 | 17 | 13 | 1.7 | 1.1 |
| 130 Sweden | 17 | 7 | 1 | (.) | 10 | 11 | 14 | 11 | 1.7 | 0.3 |

TABLE 6: ECONOMIC INDICATORS

| | GNP per capita (US \$) 1981 | GNP per capita average annual growth rate (%) 1960-1981 | Rate of inflation (%) 1970-1981 | % of population below absolute poverty level 1977-1981 | | % population urbanised | | Annual growth rate of urban population (%) 1970-1981 | ODA inflow (million US \$) 1981 | ODA as % of recipient GNP (million US \$) 1981 |
|--|-----------------------------|---|---------------------------------|--|-----------------|------------------------|------|--|---------------------------------|--|
| | | | | urban | rural | 1960 | 1981 | | | |
| Very high infant mortality countries (IMR over 100) | | | | | | | | | | |
| 1 | Upper Volta | 240 | 1.1 | 9.5 | .. | 5 | 11 | 6.0 | 217 | 15 |
| 2 | Afghanistan | 170 ^a | 0.5 ^b | 5.0 | 18 | 36 | 8 | 16 | 23 | 0.9 ^c |
| 3 | Sierra Leone | 320 | 0.4 | 12.2 | .. | 65 | 13 | 22 | 61 | 5 |
| 4 | Kampuchea | 70 ^d | -2.7 ^e | .. | .. | 11 | 15 | 1.5 ^f | 130 | 23 ^g |
| 5 | Yemen Arab Rep. | 460 | 5.5 | 15.6 | .. | 3 | 11 | 8.2 | 363 | 11 |
| 6 | Malawi | 200 | 2.7 | 10.3 | 25 | 85 | 4 | 10 | 138 | 11 |
| 7 | Guinea | 300 | 0.2 | 4.6 | .. | .. | 10 | 20 | 82 | 5 |
| 8 | Angola | 490 | -2.3 ^h | .. | .. | .. | 10 | 22 | 61 | 2 |
| 9 | Benin | 320 | 0.6 | 9.4 | .. | 65 | 10 | 15 | 82 | 7 |
| 10 | Bhutan | 80 | 0.1 | .. | .. | .. | 2 | 4 | 10 | 9 |
| 11 | Central African Rep. | 320 | 0.4 | 12.6 | .. | 23 | 29 | 4.8 ⁱ | 102 | 13 |
| 12 | Chad | 110 | -2.2 | 7.4 | 30 | 56 | 7 | 19 | 60 | 12 |
| 13 | Ethiopia | 140 | 1.4 | 4.1 | 60 ^j | 65 ^j | 6 | 14 | 241 | 5 |
| 14 | Guinea-Bissau | 190 | 2.9 ^k | 7.2 | .. | .. | 13 | 17 | 65 | 43 |
| 15 | Liberia | 520 | 1.2 | 8.9 | 23 | .. | 20 | 34 | 109 | 11 |
| 16 | Mali | 190 | 1.3 | 9.7 | 27 ^l | 48 ^l | 11 | 19 | 230 | 17 |
| 17 | Nepal | 150 | 0.0 | 9.3 | 55 | 61 | 3 | 6 | 181 | 8 |
| 18 | Somalia | 280 | -0.2 | 12.6 | 40 | 70 | 17 | 31 | 359 | 29 |
| 19 | Mauritania | 460 | 1.5 | 9.0 | .. | .. | 3 | 24 | 187 | 26 |
| 20 | Niger | 330 | -1.6 | 12.2 | .. | 35 ^l | 6 | 13 | 201 | 11 |
| 21 | Rwanda | 250 | 1.7 | 13.4 | 30 | 90 ^l | 2 | 4 | 154 | 11 |
| 22 | Senegal | 430 | -0.3 | 7.9 | .. | .. | 23 | 34 | 400 | 16 |
| 23 | Yemen, PDR | 460 | 12.1 ^h | .. | .. | 20 | 28 | 3.8 | 97 | 11 |
| 24 | Bangladesh | 140 | 0.3 | 15.7 | 86 | 86 | 5 | 12 | 1096 | 9 |
| 25 | Bolivia | 600 | 1.9 | 23.0 | .. | .. | 24 | 45 | 170 | 5 |
| 26 | Congo | 1,110 | 1.0 | 11.8 | .. | .. | 30 | 46 | 70 | 4 |
| 27 | Lao, PDR | 80 | 1.8 ^o | .. | .. | .. | 8 | 14 | 35 | 12 |
| 28 | Nigeria | 870 | 3.5 | 14.2 | .. | .. | 13 | 21 | 41 | 0.1 |
| 29 | Oman | 5,920 | 8.3 | 27.2 | .. | .. | 4 | 7 | 237 | 4 |
| 30 | Burundi | 230 | 2.4 | 11.6 | 55 | 85 | 2 | 2 | 122 | 12 |
| 31 | Egypt | 650 | 3.5 | 11.1 | 21 | 25 | 38 | 44 | 1293 | 5 |
| 32 | India | 260 | 1.4 | 8.1 | 40 | 51 | 18 | 24 | 1902 | 1 |
| 33 | Ivory Coast | 1,200 | 2.3 | 13.0 | .. | .. | 19 | 41 | 124 | 1 |
| 34 | Pakistan | 350 | 2.8 | 13.1 | 32 | 29 | 22 | 29 | 768 | 3 |
| 35 | Sudan | 380 | -0.3 | 15.9 | .. | 85 ^l | 10 | 26 | 680 | 9 |
| 36 | Turkey | 1,540 | 3.5 | 32.7 | .. | .. | 30 | 47 | 735 | 1 |
| 37 | Algeria | 2,140 | 3.2 | 13.4 | 20 | .. | 30 | 44 | 165 | 0.4 |
| 38 | Cameroon | 880 | 2.8 | 10.6 | 15 | 40 | 14 | 36 | 201 | 3 |
| 39 | Haiti | 300 | 0.5 | 10.0 | 55 | 78 | 16 | 28 | 107 | 7 |
| 40 | Lesotho | 540 | 7.0 | 10.5 | 50 | 55 | 2 | 12 | 101 | 14 |
| 41 | Mozambique | 230 | -0.1 ^h | .. | .. | .. | 4 | 9 | 144 | 5 |
| 42 | Saudi Arabia | 12,600 | 7.8 | 24.3 | .. | .. | 30 | 68 | 30 | (..) |
| 43 | Togo | 380 | 2.5 | 8.9 | 42 | .. | 10 | 21 | 63 | 6 |
| 44 | Zaire | 210 | -0.1 | 35.3 | .. | 80 ^l | 16 | 36 | 394 | 6 |
| High infant mortality countries (IMR 60 to 100) | | | | | | | | | | |
| 45 | Burma | 190 | 1.4 | 10.7 | 40 | 40 | 19 | 28 | 284 | 4 |
| 46 | Ghana | 400 | -1.1 | 36.4 | .. | .. | 23 | 37 | 145 | 3 |
| 47 | Indonesia | 530 | 4.1 | 20.5 | 28 | 51 | 15 | 21 | 975 | 1 |
| 48 | Iran | 2,160 ^p | 7.9 ^q | 20.1 | .. | .. | 34 | 51 | 9 | (..) |
| 49 | Libya | 8,450 | 4.7 | 17.3 | .. | .. | 23 | 54 | 8.1 | (..) |
| 50 | Morocco | 860 | 2.4 | 8.2 | 28 | 45 | 29 | 41 | 548 | 3 |
| 51 | Papua New Guinea | 840 | 2.5 | 8.6 | 10 | 75 | 3 | 19 | 336 | 13 |
| 52 | Tanzania | 280 | 1.9 | 11.9 | 10 | 60 | 5 | 12 | 664 | 13 |
| 53 | Tunisia | 1,420 | 4.8 | 8.2 | 20 | 15 | 36 | 53 | 241 | 3 |
| 54 | Uganda | 220 | -0.6 | 41.2 | .. | .. | 5 | 9 | 136 | 5 |
| 55 | Viet Nam | 100 ^s | 0.3 ^e | .. | .. | .. | 15 | 19 | 242 | 3 ^t |
| 56 | Zambia | 600 | 0.0 | 8.4 | 25 | .. | 23 | 44 | 231 | 7 |
| 57 | Honduras | 600 | 1.1 | 9.1 | 14 | 55 | 23 | 36 | 109 | 5 |
| 58 | Nicaragua | 860 | 0.6 | 14.2 | 21 | 19 | 41 | 54 | 170 | 7 |
| 59 | Peru | 1,170 | 1.0 | 34.3 | 49 | .. | 46 | 66 | 233 | 1 |
| 60 | South Africa | 2,770 | 2.3 | 12.8 | .. | .. | 47 | 50 | 3.1 | .. |
| 61 | Botswana | 1,010 | 7.9 | 11.6 | 40 | 55 | 2 | 28 | 15.1 ^u | 97 |
| 62 | Brazil | 2,220 | 5.1 | 42.1 | .. | .. | 46 | 68 | 3.9 | 10 |
| 63 | Ecuador | 1,180 | 4.3 | 14.1 | 40 | 65 | 34 | 45 | 235 | 0.1 |
| 64 | El Salvador | 650 | 1.5 | 10.8 | 20 | 32 | 38 | 41 | 59 | 0.6 |

| | GNP per capita (US \$) 1981 | GNP per capita average annual growth rate (%) 1960-1981 | Rate of inflation (%) 1970-1981 | % of population below absolute poverty level 1977-1981 | | % population urbanised | | Annual growth rate of urban population (%) 1970-1981 | ODA inflow (million US \$) 1981 | ODA as % of recipient GNP (million US \$) 1981 | |
|---|-----------------------------|---|---------------------------------|--|------|------------------------|-----------|--|---------------------------------|--|------------|
| | | | | 1977-1981 | | urban | rural | | | | |
| | | | | 1960 | 1981 | | | | | | |
| 65 | Iraq | 3,020 ^u | 5.3 ^h | | | 40 ^l | 43 | 5.3 | 9 | (.) | |
| 66 | Kenya | 420 | 2.9 | 10.2 | 10 | 55 | 7 | 7.3 | 450 | 6 | |
| 67 | Dominican Rep. | 1,260 | 3.3 | 9.1 | 45 | 43 | 30 | 5.3 | 105 | 1 | |
| 68 | Guatemala | 1,140 | 2.6 | 10.4 | 21 | 25 | 33 | 3.9 | 75 | 0.9 | |
| 69 | Jordan | 1,620 | 5.7 ^h | .. | 14 | 17 | 43 | 4.7 | 833 | 21 | |
| 70 | Madagascar | 330 | -0.5 | 10.6 | 50 | 50 | 11 | 5.2 | 184 | 6 | |
| 71 | Zimbabwe | 870 | 1.0 | 10.1 | .. | .. | 13 | 6.3 | 212 | 3 | |
| 72 | Colombia | 1,380 | 3.2 | 22.4 | 34 | .. | 48 | 2.6 | 102 | 0.3 | |
| 73 | Syrian Arab Rep. | 1,570 | 3.8 | 12.0 | .. | .. | 37 | 4.6 | 563 | 4 | |
| Middle infant mortality countries (IMR 26 to 50) | | 1,770 | 3.1 | 15.9 | | | 35 | 51 | 3.4 | 3214T | 0.5 |
| 74 | Mexico | 2,250 | 3.8 | 19.1 | .. | 47 | 51 | 4.2 | 100 | 0.1 | |
| 75 | Mongolia | 780 ^a | 3.0 ^b | .. | .. | .. | 36 | 4.0 | .. | .. | |
| 76 | Philippines | 790 | 2.8 | 13.1 | 32 | 41 | 30 | 3.7 | 377 | 1 | |
| 77 | Thailand | 770 | 4.6 | 10.0 | 15 | 34 | 13 | 3.4 | 407 | 1 | |
| 78 | United Arab Emirates | 24,660 | 4.5 ^h | .. | .. | .. | 40 | 16.6 | (.) | (.) | |
| 79 | Albania | 840 ^a | 4.2 ^b | .. | .. | .. | 31 | 3.4 | .. | .. | |
| 80 | Paraguay | 1,630 | 3.5 | 12.4 | 19 | 50 | 36 | 3.3 | 55 | 1 | |
| 81 | Argentina | 2,560 | 1.9 | 134.2 | .. | .. | 74 | 2.0 | 44 | 0.1 | |
| 82 | Guyana | 720 | 1.8 | 9.9 | .. | .. | 25 | 1.6 ^f | 66 | 11 | |
| 83 | Sri Lanka | 300 | 2.5 | 13.1 | .. | .. | 18 | 3.6 | 367 | 8 | |
| 84 | Chile | 2,560 | 0.7 | 164.6 | .. | .. | 68 | 2.4 | -7 | (.) | |
| 85 | China | 300 | 5.0 | .. | .. | .. | 18 | 3.4 ^f | 477 ^w | 0.2 ^w | |
| 86 | Lebanon | 1,070 ^d | 3.1 ^e | 14.6 | .. | .. | 44 | 2.8 | 451 | 14y | |
| 87 | Venezuela | 4,220 | 2.4 | 12.5 | .. | .. | 67 | 4.2 | 14 | (.) | |
| 88 | Uruguay | 2,820 | 1.6 | 60.2 | .. | .. | 80 | 0.6 | 8 | 0.1 | |
| 89 | Mauritius | 1,270 | 2.1 | 15.0 | 12 | 12 | 33 | 3.6 ^f | 58 | 5 | |
| 90 | Korea, Dem. Rep. | 1,130 ^a | 3.5 ^b | .. | .. | .. | 40 | 4.3 | .. | .. | |
| 91 | Korea, Rep. of | 1,700 | 6.9 | 19.8 | 18 | 11 | 28 | 4.6 | 331 | 0.5 | |
| 92 | Kuwait | 20,900 | -0.4 | 18.2 | .. | .. | 72 | 7.5 | 9 | (.) | |
| 93 | Trinidad and Tobago | 5,670 | 2.9 | 18.7 | .. | 39 | 22 | 1.4 | -1 | (.) | |
| 94 | Yugoslavia | 2,790 | 5.0 | 19.4 | .. | .. | 28 | 2.9 | -15 | (.) | |
| 95 | Malaysia | 1,840 | 4.3 | 7.4 | 13 | 38 | 25 | 3.3 | 142 | 0.5 | |
| 96 | Panama | 1,910 | 3.1 | 7.6 | 21 | 30 | 41 | 3.6 | 39 | 1 | |
| 97 | Romania | 2,540 | 8.2 | .. | .. | .. | 32 | 2.8 | .. | .. | |
| 98 | Costa Rica | 1,430 | 3.0 | 15.9 | .. | .. | 37 | 3.6 | 55 | 2 | |
| 99 | Jamaica | 1,180 | 0.8 | 16.8 | .. | 80 | 34 | 2.5 | 155 | 6 | |
| 100 | Portugal | 2,520 | 4.8 | 17.0 | .. | .. | 23 | 2.4 | 82 | 0.3 | |
| 101 | USSR | 4,550 ^u | 4.0 ^h | .. | .. | .. | 49 | 1.8 | .. | .. | |
| Low infant mortality countries (IMR 25 and less) | | 9,110 | 3.6 | 10.0 | | | 62 | 76 | 1.5 | 833T | |
| 102 | Hungary | 2,100 | 5.0 | 2.9 | .. | .. | 40 | 1.4 | .. | .. | |
| 103 | Poland | 3,900 ^u | 5.3 ^h | .. | .. | .. | 48 | 1.7 | .. | .. | |
| 104 | Bulgaria | 4,150 ^u | 5.6 ^h | .. | .. | .. | 39 | 2.4 | .. | .. | |
| 105 | Cuba | 1,410 ^a | 4.4 ^b | .. | .. | .. | 55 | 1.9 | 14 | 0.1c | |
| 106 | Greece | 4,420 | 5.4 | 14.8 | .. | .. | 43 | 2.5 | 13 | (.) | |
| 107 | Czechoslovakia | 5,820 ^u | 4.0 ^h | .. | .. | .. | 47 | 1.9 | .. | .. | |
| 108 | Israel | 5,160 | 3.6 | 43.5 | .. | .. | 77 | 3.1 | 772 | 4 | |
| 109 | Italy | 6,960 | 3.6 | 15.7 | .. | .. | 59 | 1.1 | .. | .. | |
| 110 | Austria | 10,210 | 4.0 | 6.1 | .. | .. | 50 | 0.6 | .. | .. | |
| 111 | Belgium | 11,920 | 3.8 | 7.3 | .. | .. | 66 | 0.4 | .. | .. | |
| 112 | German Dem. Rep. | 7,180 ^u | 4.7 ^h | .. | .. | .. | 72 | 0.2 | .. | .. | |
| 113 | Germany, Fed. Rep. | 13,450 | 3.2 | 5.0 | .. | .. | 77 | 0.5 | .. | .. | |
| 114 | New Zealand | 7,700 | 1.5 | 12.9 | .. | .. | 76 | 1.9 | .. | .. | |
| 115 | USA | 12,820 | 2.3 | 7.2 | .. | .. | 70 | 1.5 | .. | .. | |
| 116 | Ireland | 5,230 | 3.1 | 14.2 | .. | .. | 46 | 2.5 | .. | .. | |
| 117 | Singapore | 5,240 | 7.4 | 5.2 | .. | .. | 100 | 1.5 | 22 | 0.2 | |
| 118 | United Kingdom | 9,110 | 2.1 | 14.4 | .. | .. | 86 | 0.3 | .. | .. | |
| 119 | Australia | 11,080 | 2.5 | 11.5 | .. | .. | 81 | 2.0 | .. | .. | |
| 120 | Canada | 11,400 | 3.3 | 9.3 | .. | .. | 69 | 1.2 | .. | .. | |
| 121 | France | 12,190 | 3.8 | 9.9 | .. | .. | 62 | 1.4 | .. | .. | |
| 122 | Hong Kong | 5,100 | 6.9 | 18.4 | .. | .. | 89 | 2.5 | 10 | (.) | |
| 123 | Spain | 5,640 | 4.2 | 16.0 | .. | .. | 57 | 2.2 | 2 | (.) | |
| 124 | Denmark | 13,120 | 2.6 | 10.0 | .. | .. | 74 | 0.8 | .. | .. | |
| 125 | Netherlands | 11,790 | 3.1 | 7.6 | .. | .. | 80 | 0.6 | .. | .. | |
| 126 | Norway | 14,060 | 3.5 | 8.8 | .. | .. | 32 | 2.7 | .. | .. | |
| 127 | Switzerland | 17,430 | 1.9 | 4.8 | .. | .. | 51 | 1.0 | .. | .. | |
| 128 | Finland | 10,680 | 3.6 | 12.0 | .. | .. | 38 | 2.4 | .. | .. | |
| 129 | Japan | 10,080 | 6.3 | 7.4 | .. | .. | 62 | 2.0 | .. | .. | |
| 130 | Sweden | 14,870 | 2.6 | 10.0 | .. | .. | 73 | 1.0 | .. | .. | |

Footnotes to Tables

Table 1 Basic Indicators

- a 1979
- b 1977
- c 1974
- d 1972
- e 1976
- f 1975
- g 1969-71
- h 1978
- i 1971-77
- j 1973
- k UNDP estimate
- l 1969-71 rural only
- m 1971-72
- n 1980
- o 1979-81
- p East Bank only
- q 1970-71
- r 1970
- s 1969-71 Beirut only
- t 1979-81 Montevideo only
- u Lowest 50%
- v Highest 25%

- j 3 to 4 months
- k 5 to 6 months
- l 1971
- m Fully breastfeeding

Table 6 Economic Indicators

- a 1979
- b 1960-79
- c 1979 GNP
- d 1974
- e 1960-74
- f 1970-80
- g 1974 GNP
- h 1960-80
- i 1980 GNP
- j 1976
- k 1970-78
- l 1975
- m 1975 rural only
- n 1960-80
- o 1960-76
- p 1977
- q 1960-77
- r 1976 GNP
- s UNDP estimate
- t 1978 GNP
- u 1980
- v 1970-79
- w Excludes data for Taiwan
- x 1972-79
- y 1975 GNP

Table 2 Nutrition Indicators

- a 1981
- b 1969
- c 1981 (1974-76 = 100)
- d Rural only
- e 1974
- f 1967
- g 1972, rural only
- h 1980

Table 4 Education Indicators

- a 1977
- b 1972
- c 1976
- d 1975
- e 1978
- f 1973
- g 1974
- h East Bank only

Table 5 Demographic Indicators

- a 1970-1980

THE STATE OF THE WORLD'S CHILDREN 1984

In recent years UNICEF's annual *State of the World's Children* report has become one of the most widely read and written about of all publications about world development.

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regions of the world which have already achieved very low child death rates, the report also shows how this change would help to slow down the rate of population growth.

In Part II of the report, six distinguished experts in the world of child health draw on their own work to describe the revolutionary potential of these recent scientific and social developments and to spell out the practical difficulties.

Finally, Part III presents basic economic and social statistics on all the countries of the world. And in keeping with the spirit of the report, the countries are listed not in order of their GNPs but in order of their child survival rates.

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